Trade policy shocks under the second Trump administration

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Abstract

This paper analyzes the trade policy shocks implemented under the second Trump administration from January 2025 to March 2026. Combining a detailed institutional analysis of the legal instruments deployed—Section 232, IEEPA, Section 122, Section 301, and negotiated framework deals—with quantitative simulations using a global computable general equilibrium model, the paper assesses the macroeconomic and sectoral consequences of alternative tariff configurations. Five scenarios are simulated: (i) a Section 232-only regime; (ii) the post-IEEPA March 2026 architecture combining Section 232 and Section 122; (iii) the November 2025 hybrid regime combining Section 232, IEEPA, and framework deals; (iv) a prospective Section 301 overcapacity scenario in which targeted partners face an additional 25 pp surcharge on non-Section 232 products; and (v) the Liberation Day peak scenario, capturing the April 2025 IEEPA tariff regime at its most restrictive before any framework deals. Results indicate that all scenarios generate significant welfare and GDP losses for the United States and its trading partners, with U.S. GDP declining by 0.37 to 1.28% and world GDP by 0.26 to 0.62%. Targeted Section 301 tariffs produce heterogeneous effects, with non-targeted economies gaining through trade diversion (India +0.27% GDP, Rest of Latin America +0.35%), while broad-based tariff configurations generate near-universal losses. The design of the tariff instrument (its coverage breadth and partner targeting) matters as much as the average tariff level for distributional outcomes.

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Contents

1 Introduction

The inauguration of the second Trump administration in January 2025 marked the beginning of a renewed and intensified phase of U.S. trade unilateralism. Within a remarkably short timespan, the United States reactivated and expanded a set of legal instruments granting the executive branch broad discretionary power over trade policy. These included national-security tariffs under Section 232 of the Trade Expansion Act of 1962, economy-wide tariffs imposed under the International Emergency Economic Powers Act (IEEPA) - a statute historically designed for financial sanctions rather than trade regulation - and, following the judicial invalidation of IEEPA tariffs by the Supreme Court in February 2026, emergency tariffs under Section 122 of the Trade Act of 1974, supplemented by sweeping investigations under Section 301 of the same act.

What distinguishes this episode from earlier waves of U.S. protectionism is not only the magnitude of tariff increases, but the institutional hybridity of the policy framework. Trade measures justified on national security grounds coexist with emergency-based tariffs whose legal basis proved contested, while bilateral and plurilateral negotiations selectively offset these measures for specific partners. The effective trade regime faced by firms and consumers is therefore highly asymmetric, volatile, and difficult to assess using partial or descriptive approaches alone.

From an economic standpoint, the stakes are substantial. Tariffs applied to upstream sectors - metals, semiconductors, automotive inputs, intermediate manufactures - propagate through global value chains, affecting downstream production costs, consumer prices, and international competitiveness. The breadth of tariff measures amplifies these effects by directly targeting final goods, increasing the likelihood of consumer welfare losses. Negotiated deals with major partners (notably the European Union, Japan, and South Korea) introduce differentiated treatment and reshape bilateral trade patterns, generating trade diversion effects whose net impact requires a general equilibrium framework to assess.

A substantial literature emerged following the first wave of U.S. protectionism in 2018. Early contributions measured the direct trade and welfare effects of U.S.-China tariffs using partial equilibrium models and customs data (Amiti et al., 2019; Fajgelbaum et al., 2020), documenting significant pass-through into domestic prices and concentrated welfare losses among U.S. consumers. Fajgelbaum et al. (2020) estimated that the combined effect of U.S. tariffs and foreign retaliation reduced U.S. income by approximately $7.2 billion per year by end-2018. Subsequent work extended these analyses to general equilibrium settings: using CGE models, Itakura (2020), Ciuriak et al. (2018), and Bellora and Fontagné (2019) emphasized trade diversion, global value chain linkages, and retaliation, showing that while some countries benefit from diversion, global welfare losses dominate. A smaller but growing literature examines the use of national security and emergency pro-

visions in trade policy. Some scholars have highlighted risks of institutional erosion and WTO inconsistency (Bown, 2020; Lester and Manak, 2019); Harpaz (2020) anticipated the constitutional tensions that the Supreme Court ultimately resolved in February 2026. Considering counterfactual scenarios on a temporal perspective, Bouët et al. (2025) use the MIRAGE model to assess the consequences of Liberation Day and contemporaneous scenarios, finding negative impacts on the U.S. economy and differentiated effects across trading partners. This paper also builds on research emphasizing fragmentation and discrimination in modern trade agreements (Mattoo et al., 2022), interpreting bilateral deals as second-best responses to unilateral protectionism, and on Limão and Maggi (2022), who formalize conditions under which bilateral agreements between asymmetric partners can be welfare-improving even when generating trade diversion.

Relative to the existing literature, this paper makes four contributions. First, it explicitly models distinct legal instruments rather than aggregating all tariffs into a single shock, drawing directly on executive orders and proclamations at the product level. This institutional distinction is essential, as the economic mechanisms and legal durability of Section 232 measures, IEEPA-based tariffs, Section 122 emergency tariffs, and Section 301 investigations differ substantially. Second, the paper provides a counterfactual quantitative assessment based on the MIRAGE computable general equilibrium model - developed at CEPII, open-source and fully documented - which captures global reallocation of production, trade, factors, and income induced by tariff shocks. Third, the chronological design of scenarios reflects the actual sequence of policy instruments, enabling the economic contribution of each instrument to be separately identified. Finally, the comparison across scenarios - unilateral protectionism versus a hybrid regime including deals - identifies the trade diversion and welfare redistribution effects generated by a complex trade policy implemented by a large economy.

The remainder of the paper is organized as follows. Section 2 provides a detailed analysis of U.S. tariffs and their chronological evolution from January 2025 to March 2026, including negotiated framework deals and retaliatory measures adopted by U.S. trading partners. Section 3 presents the MIRAGE model, the retained geographical and sectoral aggregation, and how the macroeconomic baseline is computed. Section 4 defines the simulation scenarios. Section 5 presents and discusses the simulation results. Section 6 concludes and discusses broader policy implications.

2 U.S. trade policy instruments and architecture, 2025–2026

The trade policy implemented by the second Trump administration between January 2025 and March 2026 is best understood as a layered and adaptive architecture, in which

successive legal instruments were deployed, challenged, and partially replaced in response to judicial constraints and negotiating dynamics. Rather than constituting a coherent *ex ante* strategy, this architecture exhibits a pattern of adaptive escalation: each legal or practical obstacle to one statutory instrument prompted recourse to an alternative authority, producing an evolving and highly asymmetric tariff regime. All tariff measures described below are additional to pre-existing protection (hence, any increase of tariff labelled with a percent unity, e.g. 25%, means in reality +25 percentage points - pp), including MFN applied tariffs, preferential rates and first-term Section 301 tariffs on Chinese goods. Note that those additonal duties also stack to all temporary trade remedies such as antidumping and countervailing duties, but, due to data limitation and additional requested assumptions to translate those duties into manageable *ad valorem* equivalents (from firm specific level to HS6 products), those are not modeled in this paper.

2.1 The instruments used by the Trump administration

2.1.1 Section 232: National security as a trade policy lever

Section 232 of the Trade Expansion Act of 1962 authorizes the President of the USA to impose trade restrictions whenever imports are found to threaten national security. Although historically invoked rarely, this provision became a pillar of U.S. trade policy in 2018 with tariffs on steel and aluminum, and gained renewed and considerably expanded prominence under the second Trump administration.

In addition to re-establish the steel tariff (+25 pp) and the aluminum tariff (raised to +25 pp on most products), the administration initiated new Section 232 investigations covering: automobiles and auto parts (building on a 2019 investigation, culminating in a +25 pp tariff effective May 2025);[1] copper products (March 2025);[2] timber and lumber (March 2025);[3] pharmaceuticals and pharmaceutical ingredients (April 2025); semiconductors and semiconductor manufacturing equipment (April 2025);[4] unmanned aircraft systems (July 2025); robotics and industrial machinery (September 2025); and medical equipment and personal protective equipment (September 2025).

This proliferation of investigations reflects the administration's explicit strategy, articulated in the "America First Trade Policy" executive order of January 20, 2025,[5] of using national security determinations as a broad lever to reshape industrial supply chains. From an economic perspective, Section 232 tariffs exhibit three defining characteristics:

[1] Presidential Proclamation on Adjusting Imports of Automobiles and Automobile Parts into the United States, April 3, 2025, 90 *Fed. Reg.* 14,891. [2] Executive Order 14,272, "Adjusting Imports of Copper into the United States," March 25, 2025, 90 *Fed. Reg.* 13,841. [3] Executive Order 14,264, "Adjusting Imports of Timber and Lumber into the United States," March 1, 2025, 90 *Fed. Reg.* 11,727. [4] Federal Register Notice, Bureau of Industry and Security, "Initiation of Section 232 Investigation: Semiconductors and Semiconductor Manufacturing Equipment," April 1, 2025. [5] Executive Order 14,257, "America First Trade Policy," January 20, 2025, 90 *Fed. Reg.* 8,507.

they are sector-specific, often targeting upstream industries; legally durable, as national security determinations are difficult to challenge before international tribunals; and they create strong relative-price effects propagating through downstream value chains (Bown, 2020).

As of March 2026, the Section 232 architecture comprises seven active tariff orders: steel, aluminum derivatives, aluminum, automobiles and light trucks, copper, timber and lumber, and advanced semiconductors. Figure 1 illustrates the scale of imports covered by each measure: the automobile tariff (effective May 2025) dominates by import value, covering approximately $220 billion in annual imports; steel and aluminum measures, while smaller in aggregate value, affect a broader set of downstream industries. Canada, China, and the European Union are the dominant source economies across most measures, while the sectoral composition shifts markedly toward Asia for advanced semiconductors.

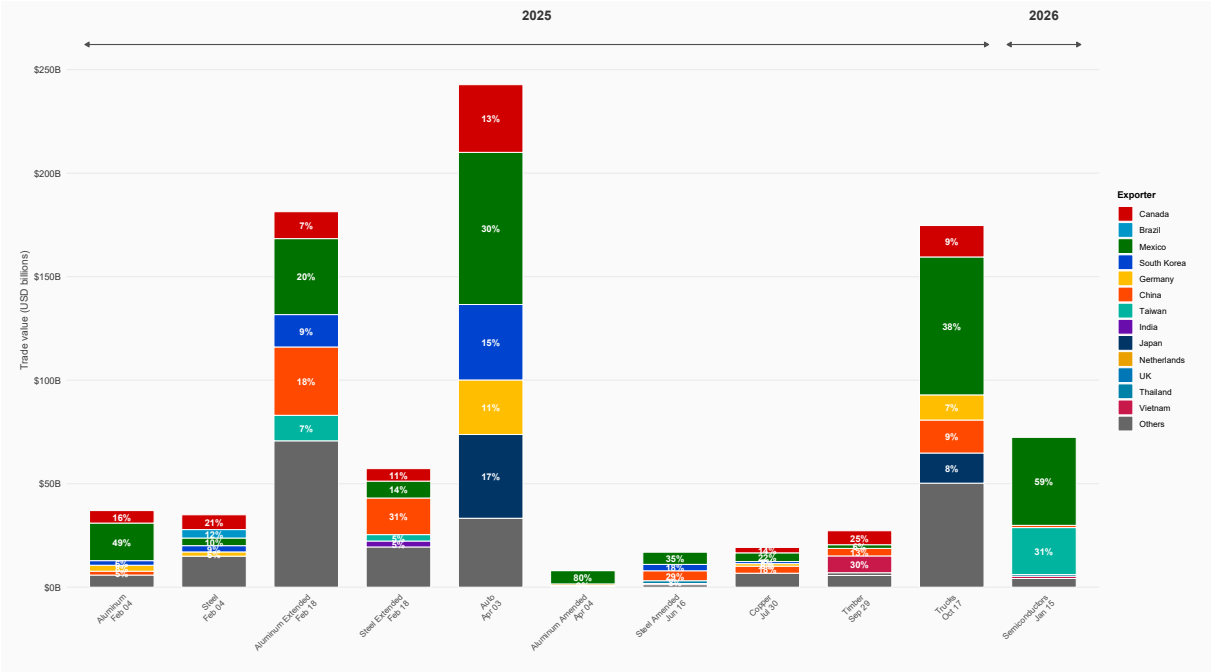

Figure 1: Section 232 tariff measures – stacked bar chart of U.S. imports subject to each Section 232 measure, by exporter (billion USD, 2024). Each bar represents a specific measure-date pair; country segments show the top 5 exporters. Source: author's calculations based on BACI (v202501), executive orders and proclamations.

2.1.2 IEEPA: Emergency powers and broad-based tariffs (February 2025 – February 2026)

The International Emergency Economic Powers Act of 1977 (IEEPA) grants the President broad authority to regulate international economic transactions in declared national emergencies. Unlike Section 232, IEEPA was not designed as a trade policy instrument; its deployment to impose across-the-board tariffs represented a significant institutional innovation with no clear historical precedent (Harpaz, 2020; Lester and Manak, 2019).

Beginning in February 2025, the administration invoked IEEPA to justify sweeping tariff increases. An additional 10% tariff on most Chinese imports - subsequently raised to 20% - was imposed on the basis that fentanyl trafficking constituted an "unusual and extraordinary threat."[6] In March 2025, tariffs of 25% were applied to most imports from Canada and Mexico, later modified for USMCA-compliant goods.[7]

On April 2, 2025 ("Liberation Day"), the administration imposed a baseline 10 percent tariff on almost all trading partners, with country-specific reciprocal rates substantially higher for 57 partners such as Vietnam (+46 pp), India (+26 pp), and the European Union (+20 pp).[8] These were partially paused on April 9, 2025 for 90 days, maintaining the baseline additional 10 percent floor while country-specific escalatory rates were suspended pending negotiations.[9] On July 31, 2025, the 90-day pause expired; it was extended for an additional 90 days for partners engaged in active negotiations, while higher rates were reinstated for non-cooperating economies, end of July-beginning of August 2025. Products exemptions were subsequently granted in April, September, and November 2025; targeted increases were also applied to Brazil and India for political reasons. Russia, Belarus, Cuba and North Korea (here after RBCNC), all subject to various sanctions, were exempted from the IEEPA, but not from sections 232 additional tariffs. Additional IEEPA tariffs did not stack with Section 232 tariffs.

IEEPA tariffs faced legal challenges from the outset. In May 2025, two federal courts ruled against them. The U.S. Court of International Trade (CIT), in *V.O.S. Selections v. Trump*, held that IEEPA does not authorize the President to impose these specific tariffs and vacated the orders. The U.S. District Court for the District of Columbia, in *Learning Resources v. Trump*, held more broadly that IEEPA does not authorize the imposition of tariffs at all. Both decisions were stayed pending appeal. In August 2025, the U.S. Court of Appeals for the Federal Circuit, sitting en banc, affirmed the CIT decision, characterizing the tariffs as "unbounded in scope, amount, and duration," while vacating the nationwide injunction pending Supreme Court review. Finally, on February 20, 2026, the Supreme Court confirmed that IEEPA does not authorize the President to impose tariffs. This lead to President Trump signed an executive order on February 20, 2026 terminating all IEEPA tariff orders (effective February 24, 2026).[10] U.S. Customs and

[6] Executive Order 14,195, "Imposing Duties to Address the Synthetic Opioid Supply Chain," February 1, 2025, 90 *Fed. Reg.* 9,121; Executive Order 14,228, "Further Imposing Duties Addressing the Synthetic Opioid Supply Chain," March 3, 2025, 90 *Fed. Reg.* 11,463. [7] Executive Order 14,193, "Imposing Duties to Address the Situation at Our Northern Border," February 1, 2025; Executive Order 14,194, "Imposing Duties to Address the Situation at Our Southern Border," February 1, 2025, 90 *Fed. Reg.* 9,113. [8] Executive Order 14,257, "Regulating Imports with a Reciprocal Tariff to Rectify Trade Practices that Contribute to Large and Persistent Annual United States Goods Trade Deficits," April 2, 2025, 90 *Fed. Reg.* 15,041. [9] Executive Order of April 9, 2025, "Modifying Reciprocal Tariff Rates to Reflect Trading Partner Retaliation and Alignment," 90 *Fed. Reg.* 15,623. [10] Executive Order of February 20, 2026, "Terminating IEEPA Tariff Orders," 91 *Fed. Reg.* 13,887.

Border Protection ceased collecting IEEPA tariffs on the same date. Cumulative IEEPA tariff collections are estimated at over $150 billion, and the CIT is overseeing a complex process of reliquidation and refund distribution.[11]

2.1.3 Section 122: Emergency tariffs as a bridge instrument

Within hours of the Supreme Court's February 20, 2026 ruling, President Trump announced the imposition of a new additional 10% global tariff under Section 122 of the Trade Act of 1974, effective February 24, 2026.[12] Section 122 grants the President authority to impose tariffs of up to 15% for periods not exceeding 150 days - without congressional authorization - when a "large and serious" U.S. balance-of-payments deficit is found to exist.

Several features distinguish Section 122 tariffs from their IEEPA predecessors. First, they are explicitly time-limited: the 150-day statutory maximum beginning February 24, 2026 implies expiration by approximately July 23, 2026. Second, they are capped at +15 pp, substantially below the country-specific reciprocal rates previously applied under IEEPA for a large number of countries. Third, certain goods are exempted, including civil aviation products eligible for duty-free treatment under the 1979 Agreement on Trade in Civil Aircraft. Fourth, Section 122 tariffs do not stack with pre-existing Section 232 tariffs. Secretary Bessent has publicly stated that the combined effect of Section 122, Section 232, and Section 301 tariffs is designed to maintain "virtually unchanged tariff revenue in 2026" relative to the IEEPA period.

The legal durability of Section 122 tariffs is itself contested. Two groups of importers filed lawsuits shortly after their imposition, arguing inter alia that the balance-of-payments justification is pretextual (Greer, 2026). The administration views the Section 122 window as a 150-day bridge during which Section 301 investigations are to be concluded, with the resulting tariffs designed to succeed the Section 122 measures before their statutory expiration. The additional tariff due to section 122 has been set to +10 pp (applied to all exporters).

2.1.4 Section 301: A return to unfair trade practice investigations

Section 301 of the Trade Act of 1974 empowers the USTR to investigate foreign acts, policies, and practices that burden or restrict U.S. commerce, and to impose tariffs or other trade countermeasures where such practices are found unreasonable or discriminatory. Unlike IEEPA and Section 122, which vest authority directly in the President, Section 301 requires a formal investigative process including public comment periods, partner

[11] https://www.skadden.com/insights/publications/2026/03/tariff-refund-mechanism-takes-shape

[12] Presidential Proclamation of February 20, 2026, "Imposing a Temporary Tariff under Section 122 of the Trade Act of 1974," 91 *Fed. Reg.* 13,901.

consultations, and inter-agency review. These procedural requirements render Section 301 measures more legally robust but slower to implement than emergency instruments.

The tariff baseline used in this paper incorporates first-term Section 301 tariffs on Chinese goods across a wide range of manufacturing sectors - including electronics, machinery, and intermediate goods, where bilateral rates of 7.5 to 25% overlay standard MFN schedules. These tariffs remained in effect throughout the Biden administration and were retained at the onset of the second Trump term.

On March 11, 2026, USTR Jamieson Greer announced the initiation of new Section 301 investigations targeting 16 major trading economies: China, the European Union, Japan, India, South Korea, Taiwan, Vietnam, Mexico, Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Bangladesh, and Thailand.[13] The investigations examine whether these economies' acts, policies, and practices relating to "structural excess capacity and production in manufacturing sectors" are unreasonable or discriminatory and burden U.S. commerce. On March 12, 2026, a second wave of investigations was announced targeting approximately 60 economies under the lens of insufficient enforcement against goods produced with forced labor.[14]

The strategic rationale is transparent: by launching these investigations early in the 150-day Section 122 window, the administration aims to conclude formal proceedings and propose tariff remedies before Section 122 expires in late July 2026, thereby providing a legally defensible replacement for the IEEPA reciprocal tariffs. From an analytical standpoint, Section 301 measures differ structurally from IEEPA tariffs in ways that matter for quantitative modeling and mid-run quantitative assessments. They are not time-limited, offering more persistent price signals to economic agents. They are product- and partner-specific, enabling more targeted calibration. And the excess-capacity framing may generate different sectoral incidence patterns than the balance-of-payments framing underlying Section 122. However, at the date of writing, results of investigations and associated tariff increases are highly uncertain.

2.2 Evolution of tariffs between January 2025 and March 2026

This section presents how the different tariff instruments evolved across months, between January 2025 and March 2026, starting with the pre-Trump situation.

2.2.1 Initial tariff protection structure (2022 baseline)

The tariff baseline used in this paper reflects the trade policy environment as of 2022, before the onset of second-term measures. This baseline includes worldwide applied tariffs

[13] Office of the United States Trade Representative, "Initiation of Section 301 Investigations into Structural Excess Capacity and Manufacturing Practices," March 11, 2026. [14] Office of the United States Trade Representative, "Initiation of Section 301 Investigations into Forced Labor Practices," March 12, 2026.

for all countries in the world, taken from the MAcMap-HS6 database (Guimbard et al., 2012). For the US, more specifically, it means that tariffs were made of MFN applied tariffs as notified to the WTO, preferential rates under various trade agreements (USMCA, the U.S.-South Korea FTA, U.S.-Japan partial agreements, and other arrangements...), the general tariff applied to specific countries, such as Cuba and North Korea. To complete this picture, the first-term Section 301 tariffs on Chinese goods across relevant HS6 categories are also included; Column 2 rates on Russian and Belarusian imports reinstated from April 2022 following the revocation of their normal trade relations status are also integrated.

Without considering Section 301 applied to China and sanctions applied to Russia, average tariff protection in the United States is low: 2.1%. Industrial goods' average tariff is about 1.8% while the tariff protection of the agricultural sector is about 5.6%. The Section 301 tariffs on Chinese goods substantially raise effective protection in specific manufacturing categories, and has an important impact on the U.S. average tariff in 2022: it increases by +2.7 pp to reach 4.8%. The reinstatement of Column 2 rates on Russian and Belarusian imports also generates an important bilateral tariff increases within the 2022 baseline - Column 2 rates for metals, fertilizers, and selected chemical products are multiples of their MFN equivalents, in some cases exceeding 50% - though the macroeconomic weight of this change is modest given the low share of these economies in U.S. import volumes.

2.2.2 Methodology

The tariff dataset used throughout this paper is constructed at the HS6 product-level × partner-level from the MAcMap-HS6 database (2022 base year), complemented by a systematic encoding of every executive order and presidential proclamation issued between January 2025 and March 2026.

Baseline tariffs (MAcMap-HS6 2022). The starting point is the MAcMap-HS6 database (Guimbard et al., 2012), which provides bilateral *ad valorem* equivalents at the HS6 level (revision 2022, i.e. 5,612 products categories)for all country pairs. For the United States, these tariffs incorporate MFN applied rates as notified to the WTO, preferential rates under USMCA, the U.S.–South Korea FTA, U.S.-Japan partial agreements, and other arrangements. The reference-group weights, constructed to mitigate the endogeneity between tariff levels and trade volumes and provided by MAcMap-HS6, are used for aggregation throughout the analysis.

Encoding of executive orders and proclamations. Each executive order, presidential proclamation, and Federal Register notice affecting U.S. tariff rates during the period is encoded as a set of product-level × partner-level dummy variables (Table 21 in

the Appendix). The encoding specifies the HS6 products covered, the affected partners, the date of entry into force, and the additional *ad valorem* percentage-point increase. Where an executive order references a product list by HTS8 or HTS10 codes, these are concorded to the HS6 level using the U.S. HTS classification structure (simple average). Where an executive order or proclamation specifies a *percentage* increase (e.g., +25%), this is interpreted as a percentage *point* addition to the existing applied tariff.

USMCA preference utilization. A distinctive feature of the IEEPA tariffs on Canada and Mexico is that USMCA-compliant goods were exempted from the additional duties. The share of bilateral trade eligible for USMCA preferences is estimated using USITC DataWeb[15] that provides import values at the HTS10 level organized by customs preference program for the reference year (2024 baseline) For each HS6 product and each of Canada and Mexico, the USMCA utilization rate, u_{ip}, is defined as the ratio of imports entering under USMCA preference program to total imports from the partner:

$$u_{ip} = \frac{V_{ip}^{\text{USMCA}}}{V_{ip}^{\text{USMCA}} + V_{ip}^{\text{non-USMCA}}},$$

where V_{ip}^{USMCA} denotes the value of imports of HS6 product i from partner p entering under USMCA preference, and $V_{ip}^{\text{non-USMCA}}$ the remainder. Products with utilization rates $u_{ip} \geq 0.50$ are treated as largely USMCA-compliant: the IEEPA exemption is assumed to apply to most of the bilateral flow, and the effective additional tariff is set to zero ($\Delta\tau = 0$). Products with $u_{ip} < 0.50$ are not considered USMCA-compliant and face additional duties, depending on the nature of the HS6 product. $\Delta\tau = +10$ pp for energy products from Canada and potassium from Mexico and Canada. Othewise, $\Delta\tau = +25$ pp or +35 pp (for Canada, depending on the period). Section 232 tariffs do not stack with theses IEEPA increases and the concerned products face their own increase as described in Section 2.1.1.

2.2.3 Temporal evolution and phase structure

Figure 2 shows how the reference group-weighted[16] average tariff rate evolved over the period. This evolution of U.S. tariff protection from the 2022 baseline through March 2026 can be organized into four distinct phases.

Phase 1 (January–March 2025): Onset of Second-Term Measures. The second Trump administration rapidly reactivated Section 232 coverage on steel and aluminum, and initiated IEEPA emergency tariffs targeting Canada, Mexico, and China. Average applied tariff rates began rising sharply. Starting from approximately 2.1% on

[15] https://dataweb.usitc.gov/ [16] Reference-group weights from MAcMap-HS6 (2022) are used instead of observed import values to avoid the endogeneity between tariff levels and trade flows. See (Guimbard et al., 2012) for a discussion of the weighting scheme.

a conventional MFN basis—or 4.9% once pre-existing Section 301 measures on China are included—the reference group-weighted average U.S. tariff rate had already reached **10.75%** by end-March 2025 (March 13, 2025), the last observation before the Liberation Day shock, reflecting the rapid stacking of IEEPA measures on Canada, Mexico, and China together with the reconstituted Section 232 steel and aluminum tariffs.

Phase 2 (April–August 2025): Peak IEEPA Coverage. The Liberation Day reciprocal tariff framework applied differentiated rates to virtually all U.S. trading partners. During this phase, U.S. average applied tariff rates rose to their highest level in the post-WWII era, reaching approximately **33.8%** at their peak (April 9, 2025), including the U.S.-China trade war. The partial 90-day pause from April 9, 2025 maintained a +10 pp global floor while suspending country-specific escalatory rates for partners in active negotiations.

Phase 3 (September 2025 – November 2025): Legal Attrition and Transition. In July, reciprocal tariffs were reinstated for a number of non-cooperating partners, while framework deals were concluded with the EU, Japan, and South Korea. Selective exemptions were granted in September and November 2025. By November 14, 2025, the average U.S. tariff rate stood at approximately **19.4%**, reflecting the combined effect of Section 232 measures, residual IEEPA tariffs, and deal-related offsets.

Phase 4 (February 2026 – July 2026): Post-IEEPA Pivot. The Federal Circuit's August 2025 confirmation of IEEPA invalidity, partial framework deals with selected partners, and the February 2026 Supreme Court ruling progressively constrained the IEEPA regime. The pivot to Section 122 on February 24, 2026 and the launch of Section 301 investigations in March 2026 define the current post-IEEPA architecture. As of February 24, 2026, the average U.S. tariff rate was approximately **15.2%**, combining the +10 pp Section 122 surcharge with active Section 232 measures. Should the Section 301 overcapacity investigations result in additional tariffs as assumed in Scenario 4, the average rate could rise to approximately **21.3%**.

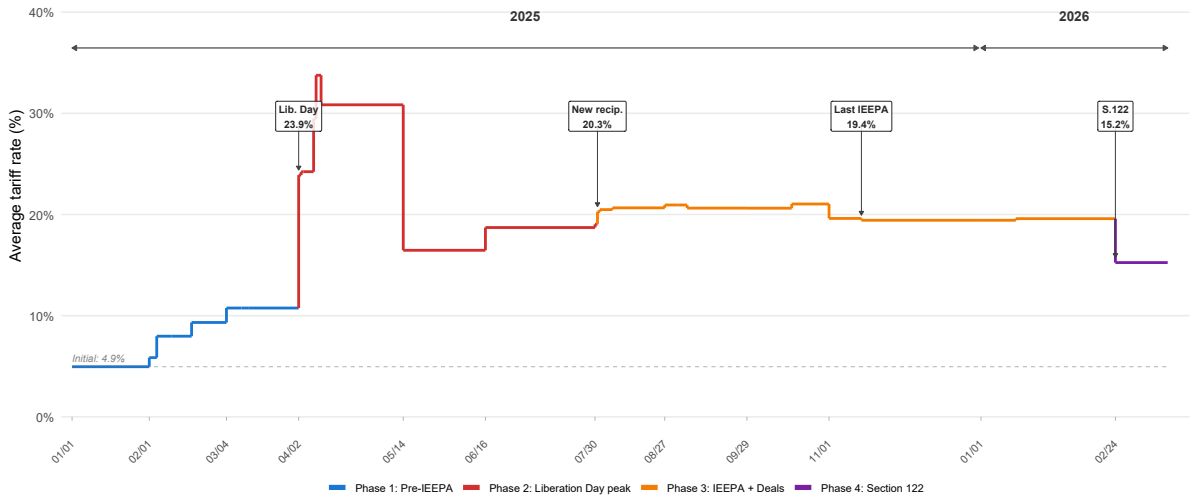

Figure 2: Evolution of the U.S. average tariff rate (%), January 2025–March 2026 (reference group-weighted across all HS6 products and trading partners). Source: author's calculations based on MAcMap-HS6 (2022), executive orders and proclamations.

2.2.4 Decomposition of tariff protection by instrument

During the period, U.S. import tariffs draw **on various overlapping legal authorities** with distinct product and partner coverage. Decomposing the tariffs by the instrument (or reason) used is interesting at it helps at refining trade policy scenarios. From the average U.S. tariff applied to the rest of the world, I distinguish 10 components.

The first component describes how the U.S. tariffs are composed in January 2025. Basically, the *ad valorem* equivalent of conventional american tariff protection at this date is mainly composed by MFN tariffs and preferential tariffs (USMCA...). Excluding sections 232 products, MFN and preferential tariffs are the tariffs to which exemptions to IEEPA or section 122 are taxed. The second tariff component is additional duties enforced through section 301 on is the Chinese imports. A third component can be distinguished: some countries are subject to highest tariff rates due to political reasons (Russia, Belarus, Cuba, North Korea). Those specific regimes are activated during our whole period of interest. Instruments 1 to 3 are already applied before the second mandat of Pr. Trump. Hence, they are accounted for in the tariff baseline.

The fourth instrument is the combination of all Section 232 measures. They are applied to products, whatever their origin, such as steel (+25 pp to +50 pp), aluminum (+25 pp to +50 pp on most products), automobiles and light trucks (+25 pp), copper, timber and lumber, and a narrow subset of advanced semiconductors (+25 pp). These measures do not stack with all other tariff increases.

Components five to nine are related to IEEPA measures. The fifth component is related to measures applied to USMCA, which add additional tariffs (+10 pp, +25 pp or

+35 pp) to Canada and Mexico products which do not comply with the rules of origin of the USMCA.The sixth component is the fentanyl tariffs applied to China. The seventh component gather all the reciprocal tariffs (Liberation day in April ; the update in July 2025). The eighth component is constituted by tariff increases applied to Brazil and India, while the ninth component represent the trade deals for the EU, UK, Japan and South Korea (those deals are linked to IEEPA as they were supposed to remove the reciprocal tariffs and replace them by specific tariff protection).

Finally, the tenth component is the Section 122 global tariff (+10 pp, effective February 24, 2026) that represents a broad add-on to MFN/preferential rates. It does not stack with Section 232 measures, but it does with pre-existing Section 301 duties (applied to China) and sanctions to RBCNC.

Formally, for each date t, every bilateral tariff line $(i,\, p)$ - where i denotes an HS6 product and p a trading partner - is assigned to exactly one instrument category $k \in \mathcal{K}$. Let τ_{ipt} denote the applied ad-valorem tariff and w_{ip} the MAcMap-HS6 reference-group weight. The reference-group-weighted average tariff is

$$\bar{\tau}_t \;=\; \frac{\sum_{(i,p)} \tau_{ipt}\, w_{ip}}{\sum_{(i,p)} w_{ip}}$$

and the contribution of instrument k is

$$C_{kt} \;=\; \frac{\sum_{(i,p)\in k} \tau_{ipt}\, w_{ip}}{\sum_{(i,p)} w_{ip}} \quad \text{so that} \quad \bar{\tau}_t \;=\; \sum_{k\in\mathcal{K}} C_{kt}\,.$$

Figure 3 plots $\{C_{kt}\}_{k\in\mathcal{K}}$ as stacked areas over the period. The 10 instrument categories $\mathcal{K}$ are: Initial (MFN/Pref: baseline applied rate, excluding pre-existing Section 301 tariffs on China), Section 301 China (pre-existing Section 301 premium on Chinese goods in the 2022 baseline), Sanctions (Column 2 rates on Russia, Belarus, Cuba, North Korea), Section 232, IEEPA Fentanyl China (+10-20 pp on China from February 4, 2025), IEEPA USMCA (Canada/Mexico, from February 4, 2025), Deals (EU, Japan, South Korea from September 5, 2025; UK from June 16, 2025), IEEPA Brazil-India (specific surcharges of +40 pp on Brazil and +25 pp on India, from August-September 2025), Section 122 (from February 24, 2026), and IEEPA reciprocal (Liberation Day, from April 2, 2025).

The decomposition is additive: each tariff line (i, p) at date t is allocated sequentially across instruments using a capped waterfall. The MFN/Pref component defines the Initial layer; the pre-existing Section 301 premium on China is then isolated as a second layer; sanctions premia, Section 232 rates, fentanyl surcharges, USMCA add-ons, deal-related offsets, and Brazil-India surcharges are then attributed in order of policy priority; any

residual above these layers is assigned to IEEPA reciprocal tariffs. In 2026, all IEEPA components are replaced by Section 122, while sanctions and Section 232 persist.

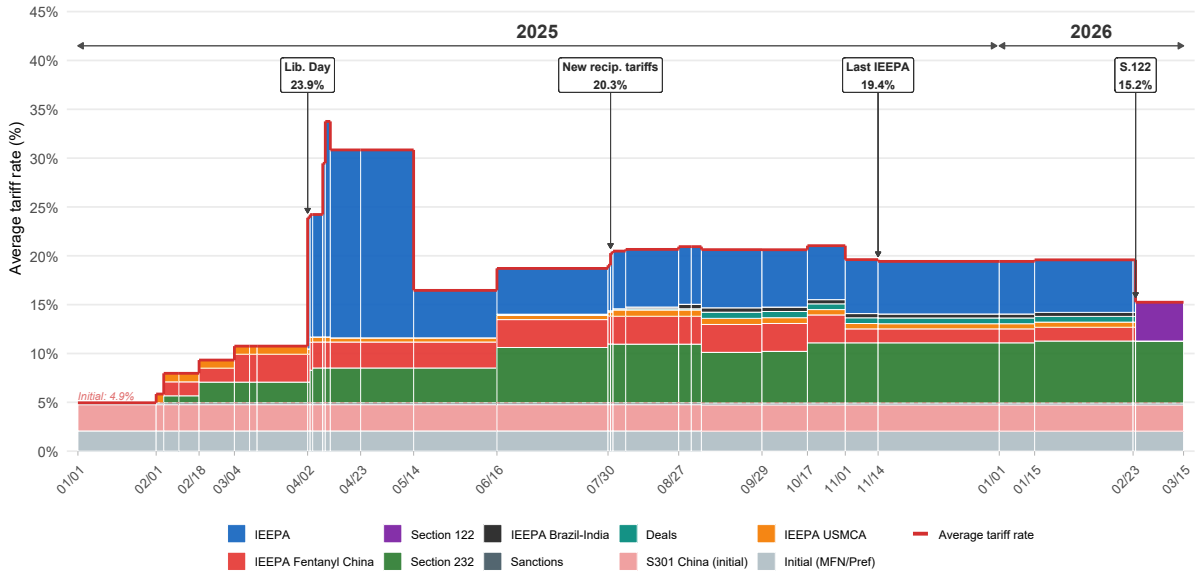

Figure 3: U.S. average tariff rate: decomposition by instrument, January 2025 – March 2026 (reference group-weighted). Each band represents the additive contribution of a single statutory instrument to the overall average tariff rate. The red line traces the total average tariff rate - its level at each date matches the value reported in Figure 2, providing a cross-check between the decomposition and the aggregate evolution. Source: author's calculations based on MAcMap-HS6 (2022), executive orders and proclamations.

Figure 3 decomposes the average rate into ten instrument-level contributions using a stacked step-function representation. The weighted average starts at 4.9% at the beginning of 2025, reflecting the pre-existing Initial (MFN/Preferential) layer (2.1%) and the pre-existing Section 301 China premium (2.8%).[17] At the Liberation Day peak (April 9, 2025), IEEPA reciprocal tariffs dominate at 22.2 pp, with IEEPA Fentanyl China contributing a further 2.7 pp and Section 232 measures 3.6 pp. Following the 90-day pause, the IEEPA reciprocal component drops sharply to approximately 4.9 pp. Section 232 measures provide a steadily growing layer – from 2.1 pp in early April to 6.4 pp by February 2026 – reflecting the progressive broadening of national-security tariffs beyond steel and aluminum into automobiles, copper, timber, and semiconductors. Framework deals with the EU, Japan, and South Korea (effective September 2025) and the UK deal (effective June 2025) generate visible offsets of approximately 3.1–3.4 pp, while IEEPA Brazil-India

[17] Russia is excluded from the reference-group weighted average: the MAcMap-HS6 2022 trade weights predate the post-2022 trade embargo, so retaining Russia would overstate the average via phantom trade flows at Column 2 rates. Belarus, Cuba, and North Korea remain in the Sanctions band but their combined contribution is negligible (<0.1 pp).

surcharges (+40 pp on Brazil, +25 pp on India, from August-September 2025) remain modest at approximately 0.4 pp. The sharp discontinuity in late February 2026 marks the overnight transition from IEEPA to Section 122, which contributes 4.0 pp alongside the persistent Section 232 (6.4 pp) layer.

2.2.5 Retaliatory measures by U.S. trading partners

The unprecedented breadth and speed of U.S. tariff escalation prompted swift retaliatory responses from several major trading partners. Despite the focus on the unilateral U.S. tariff architecture, those retaliatory tariffs are incorporated in the MIRAGE simulation scenarios. I briefly document them in this sub-section as they remain useful for interpreting the simulation results. However, I do not discuss their broader implications on trade war dynamics, as the 2025-2026 period has shown that retaliatory measures by partners, with the exception of Canada and China, were not the strategy adopted.[18]

Canada responded to U.S. tariffs through four waves of countermeasures, each imposing a +25 pp surcharge on selected U.S. products.[19]

- **March 4, 2025**: 1,256 U.S. product lines subject to +25 pp, covering steel, aluminum, consumer goods, and agricultural products.
- **March 13, 2025**: 539 additional product lines subject to +25 pp, broadening coverage to industrial inputs and machinery.
- **April 23, 2025**: 19 automotive product lines subject to +25 pp, specifically targeting USMCA non-compliant vehicles and parts.[20]
- **September 1, 2025**: A consolidated list of 314 product lines subject to +25 pp replaced the earlier tranches, resetting Canadian retaliatory tariffs to a streamlined structure while dropping some earlier products.

In total, Canadian retaliatory measures covered up to 1,814 U.S. tariff lines at their peak (summing the first three waves of retaliation), all at a uniform +25 pp rate. The September 2025 consolidation suggests a strategic recalibration, narrowing the scope of retaliation to minimize harm to Canadian consumers and downstream users while maintaining political leverage.

China implemented retaliatory tariffs in two stages.[21]

[18] The European Union adopted a more restrained approach, leveraging framework deal negotiations to limit tariff escalation while reserving the right to impose countermeasures. As of March 2026, formal EU retaliatory tariffs had not been implemented, though the European Commission publicly announced a list of U.S. products eligible for rebalancing measures in the event of deal breakdown. [19] Government of Canada, Department of Finance, "Canadian Countermeasures in Response to U.S. Tariffs," various dates (March–September 2025). [20] Canada Gazette, SOR/DORS 2025-118, April 23, 2025. [21] Ministry of Finance of the People's Republic of China, "Notice on Adding Tariffs on Certain U.S. Products," various dates (February–March 2025).

- **February 10, 2025**: A first tranche of tariff increases at variable rates (product-specific), announced on February 4 in response to the initial IEEPA fentanyl tariffs on Chinese goods.
- **March 10, 2025**: A second tranche covering two categories - 29 tariff lines at +15 pp (chicken, wheat, corn, cotton) and 711 tariff lines at +10 pp (sorghum, soybeans, pork, beef, aquatic products, fruits, vegetables, dairy products).

Chinese retaliatory measures targeted primarily U.S. agricultural exports, reflecting China's strategic focus on politically sensitive sectors in key U.S. states. The concentration on agricultural products is consistent with the trade war literature documenting the political economy of retaliation (Fajgelbaum et al., 2020).

Beyond these formal retaliatory waves, the April–May 2025 period saw an acute bilateral escalation between the United States and China constituting a de facto trade war: following Liberation Day, China raised tariffs on U.S. goods progressively, matching each successive U.S. increase, with Chinese effective tariffs on U.S. goods reaching approximately 125% and U.S. tariffs on Chinese goods reaching 145% before the May 12, 2025 pause agreement. This bilateral escalation is captured in the descriptive tariff data and is visible in Figure 2 as the peak of Phase 2. However, given the rapid de-escalation following the May 12 pause—which brought Chinese and U.S. tariffs back toward pre-war levels within weeks—this trade war peak is excluded from the MIRAGE simulation scenarios. Scenario 5 (Liberation Day) therefore corresponds to the post-Liberation Day IEEPA rate structure *without* the bilateral US-China tariff war escalation.

Canadian and Chinese retaliatory tariffs are incorporated in the MIRAGE scenarios, amplifying the negative effects on U.S. exports - particularly in agriculture, where China's targeted retaliation directly reduces U.S. market access - and further reducing U.S. welfare. EU retaliatory tariffs, not formally imposed as of March 2026, are not modeled.

2.2.6 Negotiated trade deals

Alongside unilateral tariff measures, the United States pursued negotiated framework arrangements with four major partners: the European Union, the UK, Japan, and South Korea. These deals do not eliminate tariffs but cap the applicable rate, grant product-specific exemptions, or delay escalation.

Several clarifications are warranted about the scope of this selection. Numerous other bilateral framework discussions and product-specific understandings were announced throughout 2025–2026, but the texts of many of these arrangements are vague or unofficial, limiting their tractability for modelling purposes. The four partners retained here are selected as sufficiently documented and economically significant to model. A reduction in fentanyl-related tariffs on China (−10 pp, November 2025) also occurred in the context of bilateral negotiations; it is treated as a deal in the tariff data but differs in nature from the EU,

Japan, and South Korea framework deals, which introduce a 15% tariff floor on broader product coverage. Finally, the UK arrangement, while incorporated in the tariff data (effective from June 16, 2025), has no material impact on the quantitative scenarios given the UK's trade structure and the model's sectoral aggregation.

The 2025 US-UK agreement is a sectoral arrangement that reduces tariffs and expands market access in selected goods and services while leaving the core US trade defence framework intact. In industrial goods, it provides expanded tariff-rate quota access and more flexible treatment under Section 232 for UK exports of steel and aluminium, including adjusted quotas and more accessible exclusion procedures. In the automotive sector, it improves market access conditions through reduced tariff pressure on a limited volume of UK vehicle exports, subject to quota management.

For the EU, Japan and South Korea, the general structure of the framework deals follows a common template. For each covered partner, the effective tariff on a given product is set to:

$$\tau^{\text{deal}} = \max\Big(0.15,\ \tau^{\text{MFN}}\Big),$$

where τ^{MFN} denotes the pre-existing MFN applied rate. In other words, the deal imposes a floor of 15% on covered products - equivalent to a minimum additional tariff of +15 pp over zero - while allowing products whose MFN rates already exceed 15% to retain the higher rate. This floor ensures that even preferential partners face non-trivial tariff levels, consistent with the administration's "reciprocity" rhetoric.

In addition, each deal includes sector-specific exemptions under which certain products - typically automobiles, pharmaceuticals, or agricultural goods subject to parallel negotiations - are excluded from the general cap and instead face product-specific rates negotiated bilaterally. The EU framework deal, for instance, exempts steel and aluminum products (which remain subject to Section 232 rates), while incorporating partial caps on automobile tariffs at a level below the full Section 232 rate of 25 %. The Japan arrangement focuses on preserving existing automotive trade flows and includes investment commitments. The South Korea deal combines tariff adjustments with technology and defense procurement provisions.

Several sources of uncertainty surround the implementation and durability of these deals as of March 2026. First, the transition from IEEPA to Section 122 on February 24, 2026 raises the question of whether deal commitments negotiated under the IEEPA regime continue to apply under the new statutory authority; administration officials have stated that deals remain "in force" but no new executive orders have formally re-established them under Section 122. Second, all three deal partners - the EU, Japan, and South Korea - are among the 16 economies subject to the Section 301 overcapacity investigations launched in March 2026. If Section 301 tariffs are ultimately imposed, their interaction with existing deal commitments is legally and practically uncertain: the +25 pp overcapacity surcharge

modeled in Scenario 4 would likely supersede the deal caps, effectively unwinding the preferential access that the framework agreements were designed to preserve. Third, the 150-day statutory limit on Section 122 tariffs (expiring approximately July 23, 2026) implies that in the absence of a successor instrument, the entire tariff architecture - including the deals predicated on it - would lapse, reverting to the pre-second-term baseline plus Section 232 measures only.

3 Model and data

This section describes the quantitative framework used to simulate the effects of U.S. tariff scenarios. Section 3.1 briefly presents the MIRAGE computable general equilibrium model, its structural features, and dynamic properties. Section 3.1.3 describes the data used by the model, with an emphasis of the MAcMap-HS6 database, input at the heart of this paper. Section 3.2 details the geographical and sectoral aggregation chosen to capture the most relevant policy instruments and affected industries.

3.1 The MIRAGE model

3.1.1 Overview

MIRAGE (Modelling International Relationships in Applied General Equilibrium) is a multi-region, multi-sector dynamic computable general equilibrium (CGE) model developed at CEPII since 2001. It has been widely used for the *ex-ante* quantitative assessment of trade policy changes, environmental policies, and long-term structural transformation. The model is fully open-source, with its complete code and documentation publicly available on a GitLab repository.[22] The model is fully documented in Bouët et al. (2026).

3.1.2 Core structural features

Production and factor markets. In each region and sector, production is modeled using nested constant elasticity of substitution (CES) functions. The top-level production function combines intermediate consumption (IC) and a "value-added and energy" (VA&E) composite in fixed (Leontief) proportions. Within the VA&E nest, five primary factors - land, natural resources, unskilled labor, skilled labor, and capital - are combined with energy inputs through a multi-level CES hierarchy. At the first level, land and natural resources enter alongside a labor-quality composite. Unskilled labor combines with a quality bundle Q that itself nests skilled labor and a capital-energy bundle KE. Within the KE bundle, capital substitutes with an energy composite, which further distinguishes power (electricity) from fossil fuels. Fossil fuels are disaggregated into coal and a non-coal bundle comprising oil, gas, and refined petroleum products. This nesting structure

[22] https://gitlab.com/mirage-model/mirage-public

captures the limited short-run substitutability between capital and energy while allowing greater flexibility among fossil fuel sources. Capital and skilled labor are mobile across sectors within a region, while natural resources and land are sector-specific.[23]

Capital stock dynamics follow a putty-clay structure: installed capital is assumed to be immobile across sectors within a period, so that capital reallocation occurs only through the combined effect of depreciation and new investment. The model operates in a recursive-dynamic mode, simulating the economy period by period as an overlapping sequence of short-run equilibria connected through capital accumulation and the exogenous baseline

Demand structure and product differentiation. Final demand is represented using a Linear Expenditure System (LES) nested within a CES structure, which allows income elasticities to differ across goods without excessive computational complexity. Household preferences incorporate a hierarchy of substitution: first between domestic and imported varieties (Armington substitution), then among imported varieties by origin. Intermediate demand follows a Leontief structure with respect to the aggregate bundle, combined with CES substitution between domestic and imported intermediates. This specification ensures that input-output relationships are maintained while allowing trade policy shocks to affect input costs and sectoral competitiveness throughout the (embedded) supply chain.

Imperfect competition. In manufacturing sectors where scale economies and firm entry/exit are relevant, MIRAGE incorporates a Dixit-Stiglitz framework of monopolistic competition with horizontal product differentiation. Firms are assumed to be symmetric within sectors and compete à la Cournot-Nash. The number of varieties within each sector is endogenous, adjusting at each period to satisfy a zero-profit condition. This specification allows the model to capture pro-competitive effects of trade liberalization - whereby increased import competition reduces markups and rationalizes the number of domestic firms - which are not captured by purely competitive models (Bellora and Fontagné, 2019).

3.1.3 Related data

MIRAGE is calibrated on the GTAP database, which provides global social accounting matrices (SAMs) linking production, consumption, trade, and factor markets for 160 countries and 65 sectors. The version used in this paper is GTAPpower 11, with 2017 as the reference year.

[23] The model documentation (Bouët et al., 2026) presents several sector-specific variants of this nesting for agriculture, fossil energy, and electricity production sectors.

Trade policy data are drawn from several satellite databases produced by CEPII and partner institutions. The core tariff data come from the MAcMap-HS6 database (Guimbard et al., 2012), which provides ad valorem equivalents (AVEs) of applied tariffs at the HS6 product level for bilateral trade flows between approximately 160 countries. MAcMap-HS6 covers MFN rates, preferential rates under regional and bilateral agreements, and specific and compound duties converted to ad valorem equivalents using unit values. The reference group weighting methodology developed in Bouët et al. (2008) and Guimbard et al. (2012) is used to aggregate HS6 tariff lines to the model's sectoral classification, avoiding endogeneity bias.

For non-tariff measures (NTMs) in services sectors, MIRAGE draws on the AVEs-Services database (Fontagné et al., 2016), which provides estimated *ad valorem* equivalents of regulatory barriers to services trade across countries and services sectors. These AVEs are held constant in the scenarios analyzed in this paper, which focus exclusively on goods tariff shocks; services NTMs do not change across simulations.

Trade elasticities governing the Armington substitution between domestic and imported varieties, and among imported varieties by origin, are calibrated using the "Product Level Trade Elasticities" dataset of Fontagné et al. (2022). These tariff-based elasticities are estimated at the product level and aggregated to the model's sectoral classification, providing empirically grounded parameters for the CES demand structure.

3.1.4 Macroeconomic baseline

The macroeconomic baseline of MIRAGE is anchored to long-run growth projections produced by the MaGE (Macroeconometrics of the Global Economy) model (Fontagné et al., 2013), whose outputs are collected in the EconMap database. MaGE provides consistent projections for 167 countries based on a three-factor production function combining capital K_{rt}, labor L_{rt}, and energy E_{rt}.

The model is fitted using UN population projections and econometric estimates for capital accumulation (*via* a Feldstein–Horioka-type investment–savings relationship), education attainment, female labor force participation, and two types of technical progress. Savings rates are driven by demographic structure through a life-cycle mechanism. Capital stock follows a permanent inventory process with a 6% depreciation rate. TFP growth is fueled by education levels through a catch-up process, while energy productivity growth is tempered by GDP per capita levels, reflecting the impact of structural change during development.

From EconMap, MIRAGE draws the following exogenous trajectories for its baseline:

- GDP growth rates,
- Population and labor force (skilled and unskilled),
- Saving rates and current account balances,
- Energy productivity projections.

In addition, fossil energy price trajectories are calibrated according to International Energy Agency (IEA) projections, and sector-level TFP growth differentials (agriculture, manufacturing, services) are imposed exogenously.

The MIRAGE baseline is constructed in two sequential steps. The first step consists of the calibration of the Total Factor Productivity (TFP). To do so, GDP trajectories from MaGE/EconMap are imposed exogenously, and TFP is calibrated endogenously to reproduce the target GDP growth path. Agricultural TFP follows exogenous sector-specific projections, while manufacturing and services TFP are determined residually with a constant 2 percentage-point growth differential between them. At the end of this step, the model possesses a calibrated trajectory for TFP consistent with projected macroeconomic outcomes.

The second step is the construction a policy baseline. In the dynamic path, TFP becomes exogenous (fixed at the values calibrated in Step 1) and GDP becomes endogenous. This step allows the introduction of baseline policy changes - such as Brexit (included in the current configuration), pre-existing trade agreements, and other structural assumptions - whose effects on GDP can be captured because productivity is no longer forced to absorb them. The resulting trajectory serves as the counterfactual against which simulation scenarios are compared. The tariff baseline reflects the trade policy environment as of 2022, incorporating worldwide applied tariffs from the MAcMap-HS6 database (Guimbard et al., 2012). For the United States specifically, this includes (components 1 and 2 explained in Section 2.2.4): MFN applied tariffs as notified to the WTO; preferential rates under USMCA, bilateral trade preferences such as the U.S.–South Korea FTA, and other agreements; first-term Section 301 tariffs on Chinese goods; and Column 2 rates on Russian and Belarusian imports reinstated from April 2022.

3.2 Geographical and sectoral aggregation

The model is aggregated into 22 regions, selected to identify the major targets of U.S. trade measures and their principal trading partners: the United States, Canada, Mexico, four EU member states (France, Germany, Italy, Spain), the Rest of the EU27, the United Kingdom, EFTA, China, Japan, South Korea, India, ASEAN, Brazil, Australia and New Zealand, the CIS, Rest of Latin America, the Middle East and North Africa, Sub-Saharan Africa, and the Rest of World. The full correspondence between GTAP countries and model regions is reported in Appendix C, Table 19.

In terms of partner exposure, Canada and Mexico are the most directly affected economies through their deep integration in U.S. manufacturing supply chains - particularly automotive under USMCA - and their exposure to both Section 232 and, during Phase 3, IEEPA Canada/Mexico tariffs. China faces the highest nominal tariff stack, with Section 301, Section 232, and IEEPA measures layering to produce effective rates

well above 40% on many categories. European exporters face primarily the automobile Section 232 tariff and, during Phase 3, the +20 pp IEEPA reciprocal rate.

Table 1 reports U.S. import values by partner in 2024. Total U.S. goods imports amounted to $3,132.2 billion across 1,335,656 HS6 bilateral lines, of which $2,917.9 billion (93.2%) were non-agricultural and $214.3 billion (6.8%) agricultural. The European Union is the largest source of U.S. imports ($543.0 billion), followed by Mexico ($495.5 billion), China ($455.4 billion), Canada ($400.6 billion), Japan ($141.0 billion), Vietnam ($140.5 billion), and South Korea ($130.7 billion).

Table 1: U.S. Imports by Major Trading Partner, 2024 (billion USD)

Partner	Import Value	Share (%)
EU27	543.0	17.3
Mexico	495.5	15.8
China	455.4	14.5
Canada	400.6	12.8
Japan	141.0	4.5
Vietnam	140.5	4.5
South Korea	130.7	4.2
Other partners	825.5	26.4
Total	**3,132.2**	**100.0**

Source: Author's calculations based on BACI, CEPII (v202501).

As shown in Figure 1, the sectoral distribution of Section 232 tariffs is particularly important for understanding the supply-chain propagation of shocks. The automobile and light truck tariff (+25 pp from May 2025) is the most economically significant action of the second term given the scale of U.S. auto imports - approximately $220 billion in 2024. Steel and aluminum tariffs directly affect a wide range of downstream manufacturing sectors, raising input costs for producers of machinery, packaging, construction materials, and consumer durables. The semiconductor proclamation of January 2026, while narrow in its first-phase scope, targets the most technologically sensitive upstream input in advanced manufacturing.

Hence, sectors are disaggregated to capture the most affected industries, with particular granularity for metals (iron and steel, non-ferrous metals), motor vehicles and parts, electronic equipment, chemicals, rubber and plastics, and wood products (see Appendix C, Table 20 for the full GTAP sector correspondence). Section 232 tariffs are mapped to the following GTAP sectors: iron and steel (i_s), non-ferrous metals (nfm), motor vehicles and parts (mvh), electronic equipment (ele), and wood products (lum). Service sectors are highly aggregated due to the focus on tariff measures (those sectors are only affected through general equilibrium effects).

4 The design of the scenarios

Five scenarios are defined to capture the key policy configurations of the second Trump administration's trade policy. Each represents a distinct legal and institutional configuration, allowing identification of the economic contribution of specific instruments and the role of negotiated deals. All scenarios are implemented in a single shock, occurring in 2025.[24] Hence, they are simulated as changes relative to the 2022 tariff baseline (assumed to be constant) and results are reported as percentage deviations from the counterfactual baseline in 2040.

The simulation horizon extends to 2040, a choice motivated by the recursive-dynamic structure of MIRAGE. Because capital accumulation and sectoral reallocation operate through putty-clay investment dynamics - with installed capital immobile across sectors within a period and reallocation occurring only through depreciation and new investment- the model requires a medium-term horizon to capture the full adjustment to tariff shocks. A 2040 endpoint provides approximately 15 years of adjustment from the shock date, sufficient for the capital stock to turn over substantially (at a 6% depreciation rate, roughly 60% of the 2025 capital stock will have been replaced by 2040) and for trade and production patterns to converge toward their new steady-state configuration. Shorter horizons would understate the allocative costs by truncating the adjustment process, while longer horizons would not generate any additional effects beyond those already in effect by 2040 (relative to the baseline).

An important caveat concerns the legal-institutional durability of the instruments modeled. Section 232 tariffs are legally robust and have proven durable across administrations. Section 122 tariffs are explicitly time-limited (150 days) and legally contested. Section 301 measures, while procedurally robust, are subject to ongoing investigations and potential WTO disputes. More durable tariffs may induce stronger behavioral responses if perceived as persistent changes to the trade environment; temporary or uncertain measures may have muted effects if agents anticipate reversal. The model does not capture these expectations, implying that results for scenarios involving Section 122 (that is not supposed to last in the long run) and nascent Section 301 measures should be interpreted as upper bounds on their potential impact.

Scenario 1: March 2026 — Section 122 and Section 232. This scenario captures the current trade regime as of March 2026, following the judicial invalidation of IEEPA tariffs. It combines the global +10 pp Section 122 tariff (effective February 24, 2026) with all active Section 232 measures: steel (+50 pp), aluminum (+50 pp) and the +25 pp automobiles and light trucks, copper, timber and lumber. The 2026 advanced semicon-

[24] The scenario on section 122 occurs, in reality, in 2026. Given the endpoint of each simulations, it does not change the results if implemented in 2025 instead. The same logic is applied to the prospective scenario on sections 301.

ductors section 232 is also integrated (+25 pp on covered products). No framework deals are incorporated, representing the unilateral post-IEEPA baseline before any negotiated offsets. Section 122 tariffs does not stack with Section 232 measures, but both 122 and 232 stack with applicable MFN rates, preferential tariffs and the pre-existing Section 301 tariffs on Chinese goods in force since 2018-2022.

Scenario 2: November 2025 — Section 232, IEEPA, and Deals. This scenario represents the trade regime prevailing in November 2025, approximately midway through the IEEPA operational period and following the partial pausing of country-specific reciprocal tariffs in July 2025. It combines Section 232 measures (as in Scenario 1) with IEEPA-based tariffs at the rates applicable after the 90-day pause: a global +10 pp floor for most partners, with higher residual rates for 65 partners whose "reciprocal" tariffs exceeded the floor (see Appendix A, Table 13). Rates range from 15 pp (e.g. Afghanistan, Norway, Turkey, most African and Latin American partners) to 41 pp (Syria), with notable clusters at 19–20 pp for Southeast Asian economies (Vietnam, Indonesia, Cambodia, Thailand, Malaysia, Philippines) and 25 pp for India, Brunei, and Kazakhstan. China is excluded from the reciprocal tariff list and handled separately: IEEPA fentanyl tariffs (+10 pp after the November 2025 deal, reduced from +20 pp) stack with a +10 pp residual reciprocal component and with all applicable Section 232 and legacy Section 301 tariffs, yielding effective Chinese tariff rates in the range of 50-70 pp depending on the product. Framework deals for the EU, Japan, and South Korea are incorporated, reflecting partial caps on tariff escalation negotiated during this period. This scenario captures the hybrid protectionism-plus-deals configuration that characterized the mid-IEEPA period.

Scenario 3: Section 232 Only. This scenario isolates the effect of Section 232 tariffs alone, providing the purest assessment of the national-security tariff instrument. All Section 232 measures in effect as of March 2026 are applied, but no IEEPA, Section 122, or Section 301 tariffs are incorporated, and no framework deals are modeled. Partners are treated symmetrically under MFN rates / Preferential rates plus Section 232 sector-specific measures. This scenario serves as the analytical anchor for identifying the incremental contributions of other instruments and corresponds broadly to the trade regime that prevailed in the first months of the second Trump administration, before IEEPA measures came into effect.

Scenario 4: Section 301 — Prospective Overcapacity Tariffs. This scenario simulates a prospective trade regime in which Section 301 investigations into "structural excess capacity" conclude in favor of the U.S. administration, resulting in additional tariffs on targeted partners. All Section 232 tariffs remain in effect. Section 122 is assumed to expire and is removed. For the 16 economies subject to the overcapacity

investigation - China, the EU, Japan, India, South Korea, Taiwan, Vietnam, Mexico, Singapore, Switzerland, Norway, Indonesia, Malaysia, Brazil, Turkey, and South Africa - an additional +25 pp tariff is applied to all products not already covered by Section 232, but does not applied to Section 122 exemptions. Products already subject to Section 232 measures retain their existing tariff levels. This configuration raises the weighted average U.S. tariff to approximately 21.3%, with partner-level rates reaching 42.8% for China, 20.5% for the EU, 14.7% for Mexico, 17.8% for Japan, 15.6% for South Korea, and 6.3% for Canada. This scenario assesses the potential impact of a legally durable, partner-specific tariff regime replacing the time-limited Section 122 bridge.

Scenario 5: Liberation Day — IEEPA at Peak Rates (April 2025). This scenario captures the tariff regime at its most restrictive, corresponding to the aftermath of the April 2, 2025 Liberation Day executive order (the short U.S.-China trade war rising reciprocal tariffs to +125 pp is not included) before the 90-day pausing of country-specific reciprocal tariffs and before any bilateral framework deals. All IEEPA reciprocal tariffs are applied at their unadjusted partner-specific rates, and all Section 232 measures are fully active. No framework deals are incorporated. The weighted average tariff reaches 26.4%, the highest across all five scenarios, with China facing rates of 69.9%, Japan 21.5%, South Korea 16.9%, and the EU 18.9%. This scenario serves as the upper bound on the protectionist stance of the second Trump administration and represents the peak realized tariff configuration before strategic moderation through deal-making began.

Table 2: Scenario Comparison Matrix

Instrument	Scenario 1 (S122 +S232)	Scenario 2 (S232 +IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232 +S301)	Scenario 5 (Lib. Day)
Section 232 tariffs	✓	✓	✓	✓	✓
Section 122 (10%)	✓				
IEEPA reciprocal		✓			✓
Framework deals		✓			
Section 301				✓	

Source: Author.

Table 3 presents the average tariff rates (reference group weighted) by partner across the key tariff configurations analyzed in this paper.

Table 3: Average U.S. tariff rates by main partner and scenario (%)

Partner	Reference		Scenarios				
	Conventional	Baseline	Lib. Day peak (S5)	Nov. 2025 (S2)	Feb. 2026 (S1)	S232 only (S3)	S301 overcap. (S4)
All partners	2.1	7.5	26.4	22.0	17.8	14.1	21.3
China	2.7	21.6	69.9	44.9	36.1	31.7	42.8
EU27	2.8	2.8	18.9	16.0	13.9	9.6	20.5
Mexico	0.1	0.1	11.5	17.8	16.1	14.7	14.7
Canada	0.1	0.1	7.7	16.4	8.0	6.3	6.3
Japan	1.6	1.6	21.5	17.1	12.8	9.5	17.8
South Korea	0.0	0.0	16.9	18.7	11.9	9.4	15.6

Source: Author's calculations based on executive orders and MAcMap-HS6. Reference group-weighted averages computed at the HS6 bilateral level. "Conventional" denotes MFN or preferential applied rates; "Baseline" includes pre-existing Section 301 tariffs and Column 2 rates. It also includes a subset of Russian products subject to embargo imposed by the U.S. and modelled in the baseline as a 200% tariffs (leading to an average U.S. tariff of 7.5% in the baseline).

Several patterns emerge. First, China faces by far the highest tariff rates across all configurations, reflecting the layering of pre-existing Section 301 measures with second-term instruments: the Liberation Day peak reached 69.9%, declining to 36.1% by February 2026 (still around +15 pp as compared to January 2025) and rising to 42.8% under S301 overcapacity. Second, Canada faces a moderate S301 rate of 6.3%, as it is not among the 16 economies subject to S301 overcapacity investigation, though Section 232 measures remain in place. Third, Mexico's S301 burden (14.7%) equals its S232-only rate, indicating that overcapacity-specific measures add no further tariffs beyond pre-existing S232 steel and aluminium duties. The EU faces a higher rate of 20.5% under S301, reflecting broader product coverage from overcapacity-related duties. Fourth, Japan and South Korea face average rates of 17.8% and 15.6% respectively under S301 (S4), above their S232-only levels but well below S2 and S5 peaks.

5 Results

This section presents the MIRAGE simulation results for Scenarios 1 through 4 as defined in Section 4, reported as percentage deviations from the counterfactual baseline in 2040. Results are organized along three dimensions: global macroeconomic effects, impacts on the United States, and distributional consequences across trading partners. Tables present scenarios in order (S1–S4) to facilitate comparison across policy configurations. Results for Scenario 5 (Liberation Day), which represents the peak realized tariff configuration,

are reported separately in Appendix B for reference; key findings are discussed in the text where relevant.

5.1 Global macroeconomic effects

All five scenarios produce negative effects on global GDP and trade volumes relative to the baseline. In the Armington trade framework underlying MIRAGE, tariffs introduce a wedge between world and domestic prices, generating allocative inefficiency by distorting the composition of demand across origins. These distortions are compounded by input-output propagation - tariffs on intermediate goods raise production costs throughout embedded supply chains - and by the imperfect competition structure in manufacturing, where reduced import competition weakens pro-competitive discipline, allowing domestic markups to rise and the equilibrium number of varieties to fall.

Table 4: Global macroeconomic effects (% deviation from baseline, 2040)

	Scenario 1 (S122 +S232)	Scenario 2 (S232+IEEPA +Deals)	Scenario 3 (S232 only)	Scenario 4 (S232 +S301)
World GDP (vol)	−0.40	−0.54	−0.26	−0.37
World Welfare	−0.36	−0.49	−0.23	−0.35
World Imports (vol)	−2.86	−3.52	−2.05	−2.62
World Exports (vol)	−2.86	−3.51	−2.06	−2.60
World Goods Imports (vol)	−3.43	−4.19	−2.46	−3.10
World Goods Exports (vol)	−3.45	−4.21	−2.48	−3.10

Source: Author's calculations using the MIRAGE model. Liberation Day results (Scenario 5) are reported in Table 15 in the Appendix.

Scenario 3 (Section 232 only) generates the smallest global effects, with world GDP declining by 0.26% and world welfare by 0.23%. Although Section 232 measures target a narrow set of upstream sectors, these sectors occupy critical positions in global supply chains. In MIRAGE's Leontief input-output structure, tariffs on upstream intermediates propagate to downstream sectors by raising input costs, reducing their competitiveness even when not directly targeted. The imperfect-competition framework further amplifies losses: reduced import competition weakens pro-competitive discipline, allowing domestic markups to rise and the number of varieties available to consumers to fall. **It is worth noting that this scenario alone generated approximateively 65% of the world losses (in terms of GDP or welfare) of Scenario 1 and almost half of Scenario 2.**

Scenario 1 (Section 122 + Section 232) nearly doubles the welfare loss (−0.36%) relative to Scenario 3, reflecting the broad product coverage of the 10% Section 122 tariff applied to virtually all trading partners. While Section 232 affects specific value chains,

Section 122 raises the cost of imports across the entire goods spectrum, including final consumer goods. Under the LES demand system in MIRAGE, broad-based tariffs impose welfare costs distributed unevenly across consumption baskets, with larger relative burdens on goods with lower substitutability. The incremental effect on global trade volumes - which contract by nearly 3% - reflects the Armington substitution mechanism: higher import prices reduce demand for foreign varieties, but finite substitution elasticity implies that tariffs generate deadweight losses rather than full import replacement.

Scenario 2 (Section 232 + IEEPA + Deals) produces larger global effects than Scenario 1, with world GDP declining by 0.54% and welfare by 0.49%. Despite the moderating effect of framework deals with the EU, Japan, and South Korea, the breadth of IEEPA coverage - including elevated rates for Vietnam (+46 pp), India (+26 pp), and China (+20 pp on top of Section 301 tariffs) - generates efficiency losses exceeding those of the post-IEEPA Section 122 architecture. The deals partially offset these losses for covered partners but cannot prevent the aggregate welfare reduction, because even partially offset tariffs distort relative prices and misallocate demand across origins within the Armington framework.

Scenario 4 (Section 301 overcapacity) generates world GDP losses of 0.37% - smaller than both Scenario 1 (0.40%) and Scenario 2 (0.54%) - despite raising the average tariff to 21.3%. The more targeted nature of Section 301 (applying to 16 specific economies) limits its global trade impact: world imports contract by 2.62%, significantly less than the 3.52% under the more broadly applied IEEPA regime of Scenario 2. This illustrates that the breadth of tariff coverage matters more for aggregate trade disruption than the average tariff rate alone.

The Liberation Day scenario (Scenario 5, see Appendix B) produces the largest global effects, with world GDP declining by 0.62% and welfare by 0.58%. This scenario represents the peak realized tariff configuration, combining IEEPA reciprocal tariffs at their unadjusted rates without any framework deals. The absence of deal-based moderation means that all major partners face elevated tariff rates simultaneously, maximizing the aggregate allocative distortion.

5.2 Effects on the United States

The United States experiences negative GDP effects across all five scenarios, with welfare effects negative across all scenarios as well. Results for Scenario 5 (Liberation Day) are reported in Appendix B.

Table 5: Effects on the United States (% deviation from baseline, 2040)

	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
GDP (vol)	−0.66	−0.87	−0.37	−0.70
Welfare	−0.42	−0.66	−0.18	−0.44
Imports (vol)	−12.51	−16.33	−8.14	−10.80
Exports (vol)	−17.93	−22.67	−12.00	−16.49

Source: Author's calculations using the MIRAGE model. Imports and exports in volume, excluding intra-regional trade. Liberation Day results (Scenario 5) are reported in Table 16 in the Appendix.

U.S. GDP contracts by 0.37% under Section 232 alone (Scenario 3), rising to 0.66% under Section 122 plus Section 232 (Scenario 1), to 0.87% under the IEEPA architecture with deals (Scenario 2), and 0.70% under Section 301 (Scenario 4). Under the Liberation Day peak (Scenario 5, Appendix B), U.S. GDP declines by 1.28%. Welfare effects are negative across all scenarios, ranging from −0.18% under Scenario 3 to −1.10% under Liberation Day. Under Scenario 3, the welfare loss remains modest, reflecting the partial offset from the optimal tariff effect - when tariffs are narrowly targeted on sectors where the United States has market power and finite foreign supply elasticity, the terms-of-trade improvement (tariff revenue extracted from foreign exporters) partially offsets the allocative efficiency loss for the tariff-imposing country. Under broader tariff configurations, the welfare loss increases from −0.42% (Scenario 1) to −0.66% (Scenario 2) and −1.10% under Liberation Day (Scenario 5). Scenario 4 (Section 301) produces a U.S. welfare loss of −0.44%, lower than Scenario 2 despite a higher average tariff, reflecting the more targeted nature of S301 surcharges. The gap between GDP and welfare effects reflects MIRAGE's putty-clay capital structure: because installed capital is immobile across sectors within a period, factors cannot instantly reallocate from contracting sectors (e.g., downstream users of tariff-affected intermediates) to expanding ones (e.g., tariff-protected upstream sectors), resulting in short-run output losses that exceed the pure allocative efficiency loss captured by the welfare measure.

A notable finding is the asymmetry between import and export contractions. U.S. exports decline substantially more than imports across all scenarios - by approximately 4% in Scenario 3 and 5–6% in Scenarios 2 and 4. This asymmetry is driven primarily by general equilibrium price adjustments rather than by foreign retaliation alone. As U.S. tariffs reduce import volumes and improve the trade balance in nominal terms, the real exchange rate appreciates. This appreciation erodes U.S. export competitiveness across all sectors, including those not directly targeted by tariff measures. Simultaneously, partner countries whose exports to the U.S. market are displaced redirect productive capacity toward third markets, intensifying competitive pressure on U.S. exporters abroad. Canadian and Chinese retaliatory tariffs, which are incorporated in the simulations, further

reinforce the export contraction through direct barriers to U.S. export market access.

5.3 Bilateral trade effects

Beyond aggregate import and export volumes, the MIRAGE simulations reveal substantial bilateral trade reallocation across partners. Table 6 reports the percentage change in bilateral exports to the United States (at FOB values) for key partners, and selected third-country trade flows illustrating trade diversion patterns.

Table 6: Bilateral exports to the United States (% deviation from baseline, 2040)

Exporter → USA	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
Canada	−15.35	−24.35	−11.78	+39.19
Mexico	−30.36	−36.84	−12.58	−48.39
China	−10.54	−17.55	−6.90	−63.90
Germany	−13.87	−4.26	−8.10	−19.53
Japan	−12.49	−2.68	−6.89	−18.08
South Korea	−12.23	−15.32	−5.46	−19.75
India	−9.95	−48.07	−0.15	+12.50
ASEAN	−8.97	−11.49	−5.42	−43.68
Brazil	−10.87	−56.31	−3.22	−7.09
UK	−12.22	−6.26	−0.13	+3.85

Source: Author's calculations using the MIRAGE model. Liberation Day results (Scenario 5) are reported in Appendix B.

Several patterns emerge from the bilateral trade data. First, the concentration of losses on NAFTA partners is striking: Mexico's exports to the United States decline by 12.6 to 48.4% across scenarios, reflecting Mexico's extreme dependence on the U.S. market and the combined burden of Section 232 automotive tariffs and IEEPA/Section 122 surcharges. Canada experiences comparable declines under Scenarios 1–3 (−11.8 to −24.4%), but its exports to the United States surge by 39.2% under Scenario 4 (Section 301), as it captures market share from S301-targeted competitors.

Second, deal effects are visible in bilateral flows: Germany's and Japan's exports to the United States decline by only 4.3 and 2.7% respectively under Scenario 2 (IEEPA + Deals), compared to 13.9 and 12.5% under Scenario 1 (S122+S232). This directly reflects the tariff caps embedded in the framework deals, which preserve bilateral market access for covered partners.

Third, trade diversion under Scenario 4 extends beyond the aggregate GDP gains documented in Section 5.4. India's exports to the United States increase by 12.5% under S4, despite declining under all other scenarios. The UK (+3.9%) similarly benefits. China's

exports to the U.S. collapse by 63.9% under S4, the largest bilateral contraction across all scenario-partner combinations, reflecting the cumulative effect of pre-existing Section 301 tariffs, Section 232 tariffs, and the additional S301 overcapacity surcharge.

The bilateral trade data also reveal significant third-country trade diversion. Under Scenario 4, Chinese exports to Canada increase by approximately 30%, as Chinese producers displaced from the U.S. market redirect toward the nearest large open economy. Similarly, Mexican exports are redirected toward Central and South American markets. These diversion flows imply that the welfare gains of non-targeted economies under S4 partly reflect increased access to cheapened imports from displaced exporters - a second-order effect that reinforces the positive GDP impact documented above.

5.4 Distributional effects across trading partners

Table 7 presents GDP effects for all 22 model regions, while Table 8 presents welfare effects for the main trading partners.

Table 7: GDP Effects by Country/Region (% deviation from baseline, 2040)

Country/Region	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
USA	−0.66	−0.87	−0.37	−0.70
Canada	−1.57	−2.59	−1.24	−0.85
Mexico	−6.55	−3.68	−6.39	−4.56
China	−0.19	−0.36	−0.11	−0.27
Germany	−0.57	−0.35	−0.30	−0.90
Rest of EU27	−0.46	−0.35	−0.23	−0.74
France	−0.05	+0.13	−0.00	−0.19
Italy	−0.38	−0.09	−0.16	−0.67
Spain	−0.15	−0.10	−0.07	−0.26
UK	−0.11	−0.11	−0.02	+0.11
EFTA	−0.25	−0.78	−0.06	+0.08
Japan	−0.16	−0.18	−0.15	−0.34
South Korea	−0.34	−1.08	−0.17	−0.59
India	−0.25	−0.91	+0.02	+0.27
ASEAN	−0.23	−0.33	−0.21	−0.38
Brazil	+0.09	−0.87	−0.01	−0.02
Australia & New Zealand	−0.09	−0.12	−0.05	−0.02
CIS	−0.08	−0.11	−0.07	−0.08
Rest of Latin America	−0.03	−0.07	−0.05	+0.35
Middle East & North Africa	−0.15	−0.15	−0.10	−0.19
Sub-Saharan Africa	−0.04	−0.06	−0.00	−0.07
Rest of World	−0.47	−0.56	−0.33	−0.21

Source: Author's calculations using the MIRAGE model. Liberation Day results (Scenario 5) are reported in Table 17 in the Appendix.

Table 8: Welfare Effects by Country/Region (% deviation from baseline, 2040)

Country/Region	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
USA	−0.42	−0.66	−0.18	−0.44
Canada	−1.58	−2.63	−1.23	−0.95
Mexico	−6.10	−4.64	−5.96	−4.44
China	−0.17	−0.28	−0.10	−0.25
Germany	−0.54	−0.33	−0.29	−0.89
Japan	−0.19	−0.22	−0.15	−0.41
South Korea	−0.52	−0.96	−0.37	−0.84
India	−0.24	−0.76	−0.04	+0.17
ASEAN	−0.41	−0.59	−0.23	−0.72
Brazil	−0.00	−0.58	−0.07	−0.16

Source: Author's calculations using the MIRAGE model. Liberation Day results (Scenario 5) are reported in Table 18 in the Appendix.

5.4.1 Most affected economies

Mexico stands out as the most severely affected economy in GDP terms under Scenarios 1 and 3, with losses ranging from 3.68% (Scenario 2) to 6.55% (Scenario 1). Under the Liberation Day scenario (Scenario 5, Appendix B), Mexico's loss is 0.54%. The extreme variation across scenarios reflects Mexico's differentiated exposure to each tariff instrument. Under Scenarios 3 and 1, where Mexico faces primarily Section 232 automotive tariffs, GDP losses of 6.39 and 6.55% reflect Mexico's deep integration with U.S. manufacturing supply chains, particularly in the automotive sector. Under Scenario 4 (Section 301), Mexico's GDP loss is −4.56% — more moderate than Scenarios 1 and 3 — because while Mexico faces the full 25 pp S301 surcharge on non-S232 products, the simultaneous removal of Section 122 partially offsets the impact. In MIRAGE's input-output structure, the motor vehicles and parts sector exhibits dense intermediate linkages with upstream metals and downstream distribution, so that tariff shocks propagate through Mexico's integrated supply chain, reducing output and factor demand across multiple sectors. Under Scenario 2 (IEEPA + Deals), Mexico's GDP loss is −3.68%, reflecting the relatively lower IEEPA rate on Mexico compared to other partners. Under Scenario 5 (Appendix B), Mexico benefits from preferential access through USMCA-related provisions, limiting its tariff exposure relative to Asian and European competitors facing steeper IEEPA reciprocal rates.

Canada's trajectory is strikingly scenario-dependent. Under Scenarios 1–3, Canada experiences GDP losses ranging from −1.24 to −2.59%, with the largest loss under Scenario 2 (IEEPA + Deals) reflecting the consequences of U.S. trade deals with partners

such as the EU, Japan or South Korea. Under Scenario 4 (Section 301), Canada records a loss of −0.85% — the least severe among Scenarios 1–4. Canada is not among the 16 economies subject to Section 301 investigation and, with Section 122 removed, faces significantly lower tariffs than targeted partners. However, the net trade diversion effect is insufficient to generate a GDP gain.

China experiences relatively moderate and stable GDP losses (−0.11 to −0.42% across Scenarios 1-4; −0.71% under Scenario 5, Appendix B). This stability reflects the pre-existing Section 301 tariff structure in the baseline, which already raises the effective price of Chinese exports to the United States by 7.5 to 25% across affected categories. In the CES framework, the marginal trade-reducing effect of an additional tariff increment is decreasing in the initial tariff level: U.S. importers have already substituted away from Chinese varieties, so the remaining bilateral trade flows are concentrated in products where substitution possibilities are most limited.

5.4.2 Trade diversion and scenario 4 beneficiaries

A key finding is the near-absence of trade diversion beneficiaries under Scenarios 1-3. Simulations show that all economies experience negative GDP effects under these broad-based tariff configurations. The sole exception is Brazil under Scenario 1 (+0.08%), discussed below. The same pattern holds under Scenario 5 (Appendix B), with only marginal gains for Rest of Latin America (+0.21%) and Brazil (+0.11%). The mechanism is that broad-based tariffs, whether through Section 122, IEEPA, or Liberation Day configurations, simultaneously raise the price of U.S. imports from all origins, limiting the scope for Armington substitution to redirect U.S. demand toward specific untaxed partners. The resulting global contraction in trade volumes and economic activity generates negative spillovers that dominate any trade diversion gains for third parties.

Scenario 4 (Section 301) presents a strikingly different pattern. Because Section 301 tariffs are targeted at 16 specific economies while Section 122 is removed, countries *not* subject to the investigation experience trade diversion benefits. India (+0.27% GDP), the UK (+0.11%), EFTA (+0.08%), and Rest of Latin America (+0.35%) gain. Canada, though not targeted, records only a modest loss (−0.85%): trade diversion benefits are insufficient to offset general equilibrium spillovers. The mechanism for beneficiaries is twofold. First, the Armington substitution structure implies that when U.S. tariffs raise the price of imports from targeted origins, U.S. demand shifts toward less taxed sources, directly expanding exports for these economies. Second, production displaced from targeted partners and the U.S. market is redirected toward third markets, easing competitive pressures.

India's trajectory across scenarios is particularly informative: it experiences a small gain under Scenario 3 (+0.02%), moderate losses under Scenario 1 (−0.25%), large losses under Scenario 2 (−0.91%, reflecting the 25 pp IEEPA reciprocal tariff), but a gain under

Scenario 4 (+0.27%). Under Scenario 5 (Appendix B), India also loses (−0.54%), but less compared to Scenario 2 (despitre a marginal higher increase of tariffs: +26 pp). This sign reversal under Scenario 4 reflects India's exclusion from the S301 partner list: with Section 122 removed and no S301 surcharge, India faces minimal tariffs and captures market share from targeted competitors.

5.4.3 Brazil: the exception under Scenario 1

Brazil exhibits a distinctive cross-scenario profile. Under Scenario 1 (Section 122 + Section 232), Brazil records a marginally positive GDP effect (+0.09%), making it the sole economy to register a gain under a broad-based tariff configuration in Scenarios 1–3. Yet this gain evaporates under every other scenario: −0.87% under Scenario 2, nearly zero (−0.01%) under Scenario 3, and −0.02% under Scenario 4.

The positive S1 outcome requires careful interpretation. Under Scenario 1, Section 122 imposes a flat +10 pp floor on all partners simultaneously, including Brazil. On its own, this should reduce U.S. demand for Brazilian goods. However, the same uniform tariff burden applies to all of Brazil's agricultural and commodity competitors: Asian economies (Vietnam, Indonesia, Cambodia) face the same +10 pp floor as Brazil, while China faces the S301 stack on top of S122. The net effect is that Brazil is not singled out for differential treatment: it neither receives a preferential exemption nor is it subject to targeted instrument (unlike in Scenario 2 where the IEEPA Brazil-India surcharge of +40 pp imposes a large asymmetric burden).

The slight GDP gain (+0.08%) likely reflects a subtle compositional advantage: Brazil's export structure is concentrated in agricultural commodities (soybeans, meat, sugar) and natural resources (iron ore, crude oil), sectors where Section 232 does not apply and where the uniform S122 floor hurts differentiated manufactured goods exporters more. As competing exporters in manufacturing-intensive categories face larger economic contractions, demand in third markets for Brazilian agricultural exports faces less competitive pressure, generating a small positive second-round effect. The near-neutral terms-of-trade outcome (−0.23% under S1, Table 12) confirms that the GDP gain comes through volume rather than price effects.

The near-complete reversal under Scenario 2 (−0.87%) is explained by the IEEPA Brazil-India surcharge, a +40 pp tariff applied to nearly all Brazilian exports as of August 2025. This targeted shock, absent in S1, overwhelms any diffuse trade diversion gains. The S4 result (−0.02%) reflects Brazil's inclusion in the 16-economy Section 301 investigation list, which eliminates any preferential-access advantage. Together, these cross-scenario contrasts illustrate how the sign of GDP effects for mid-sized commodity exporters is highly sensitive to instrument design: broad, non-discriminatory tariffs (S1) may generate near-neutral or marginally positive outcomes for commodity exporters, while targeted surcharges (S2) or formal investigation inclusion (S4) produce significant

losses, in a global environment.

5.4.4 Effects on the European Union

EU member states experience uniformly negative GDP effects across all five scenarios, with the largest losses under Scenario 4 (Section 301). Germany, with its export-oriented economy and significant automobile sector, experiences the largest losses among individually modeled EU members, ranging from −0.30% (Scenario 3) to −0.90% (Scenario 4). The Section 232 auto tariff (+25 pp) directly affects Germany's motor vehicle export sector, and input-output propagation transmits this shock upstream to steel, non-ferrous metals, and machinery sectors. Under Scenario 4, the additional 25 pp Section 301 surcharge on EU exports amplifies Germany's losses substantially. The Rest of EU27 aggregate shows comparable effects (−0.23 to −0.74%), reflecting a composition effect across smaller member states. France displays a notable pattern: its GDP effect under Scenario 2 is slightly positive (+0.13%), reflecting its lower direct exposure to Section 232 products and the partial offset provided by the EU framework deal. Italy (−0.09 to −0.67%) and Spain (−0.07 to −0.26%) show more moderate losses, consistent with their more diversified export structures. The UK, not being part of the EU27 and not subject to the EU's deal framework, shows losses of −0.02 to −0.11% under Scenarios 1–3, and gains under Scenario 4 (+0.11%) as a non-targeted economy under Section 301.

5.5 Sectoral value added effects

The aggregate GDP effects presented above conceal significant sectoral heterogeneity in real value added responses across the tariff scenarios. Tables 9–11 report the effects of each tariff configuration on value added (in volume) across broad sectors (Energy, Agriculture, Manufacturing, Services) for the United States and its main trading partners, as well as detailed U.S. manufacturing subsectors.

For the United States, manufacturing value added increases substantially across all scenarios (+1.89 to +4.82%), reflecting the intended import substitution effect of tariff protection. These gains, however, are more than offset at the aggregate level by losses in Energy (−2.50 to −4.12%), Agriculture (−1.91 to −3.18%), and Services (−0.52 to −1.12%) – sectors that face higher input costs without benefiting from tariff protection. Within U.S. manufacturing, the effects are strikingly heterogeneous: ferrous metals gain 25–29% depending on the scenario, motor vehicles 23–40%, and electrical equipment 12–22%, while pharmaceuticals lose 11–22% and chemicals 4–9%, reflecting the detrimental impact of higher input costs on downstream sectors that rely on imported intermediates.

Mexico's manufacturing sector experiences significant losses across Scenarios 1–4, with value added losses of −6.60 to −11.09%, while its energy and agricultural sectors expand as resources are reallocated away from manufacturing. Canada's manufacturing sector

declines across all scenarios, with losses ranging from −5.53% under Scenario 4 to −18.73% under Scenario 2. Germany's manufacturing losses (−0.64 to −1.44%) are partially offset by energy sector gains, consistent with the input cost reduction channel as global energy prices decline in response to reduced industrial demand.

Table 9: U.S. Value Added by Broad Sector (% deviation from baseline, 2040)

Sector	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
Energy	−3.66	−4.12	−2.50	−3.54
Agriculture	−2.75	−3.18	−2.21	−1.91
Manufacturing	+2.94	+4.82	+1.89	+2.87
Services	−0.77	−1.12	−0.52	−0.82

Source: Author's calculations using the MIRAGE model. S5 (Lib. Day): Energy −4.96, Agriculture −2.55, Manufacturing +4.87, Services −1.43.

Table 10: Value Added Effects by Broad Sector for Main Trading Partners (% deviation from baseline, 2040)

Country	Sector	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
China	Energy	+0.10	+0.11	+0.03	+0.19
	Agriculture	+0.22	+0.28	+0.07	+0.18
	Manufacturing	−0.26	−0.39	−0.15	−0.36
	Services	−0.04	−0.08	−0.03	−0.06
Japan	Energy	−0.21	−0.41	−0.09	−0.34
	Agriculture	+0.13	−0.07	+0.40	+0.34
	Manufacturing	−0.32	−0.10	−0.66	−0.71
	Services	−0.05	−0.09	+0.00	−0.11
South Korea	Energy	−0.12	−0.91	+0.11	−0.43
	Agriculture	+0.06	+0.38	+0.02	+0.20
	Manufacturing	−0.52	−1.14	−0.41	−0.86
	Services	−0.23	−0.33	−0.18	−0.36
Germany	Energy	+0.02	−0.10	+0.11	+0.23
	Agriculture	+0.32	−0.11	+0.34	+0.35
	Manufacturing	−0.97	−0.59	−0.64	−1.44
	Services	−0.15	−0.09	−0.06	−0.26
Rest of EU27	Energy	+0.02	−0.25	−0.03	+0.23
	Agriculture	+0.01	−0.21	+0.03	+0.01
	Manufacturing	−0.99	−0.54	−0.56	−1.80
	Services	−0.12	−0.12	−0.05	−0.15
Canada	Energy	+1.06	+2.42	+1.33	+0.62
	Agriculture	+3.24	+4.54	+3.83	+2.80
	Manufacturing	−9.92	−18.73	−8.68	−5.53
	Services	+0.32	+0.77	+0.27	+0.11
Mexico	Energy	+6.00	+4.60	+6.48	+4.17
	Agriculture	+5.84	+3.85	+6.15	+5.07
	Manufacturing	−10.32	−8.34	−11.09	−6.60
	Services	−3.11	−2.29	−2.94	−2.51

Source: Author's calculations using the MIRAGE model. Scenario 5 (Liberation Day) results available from the author upon request.

Table 11: U.S. Value Added by Detailed Manufacturing Sector (% deviation from baseline, 2040)

Sector	Scenario 1 (S122+S232)	Scenario 2 (S232+IEEPA+Deals)	Scenario 3 (S232 only)	Scenario 4 (S232+S301)
Ferrous metals	+25.09	+24.67	+28.86	+28.42
Non-ferrous metals	+13.94	+15.37	+15.01	+14.58
Motor vehicles	+28.36	+23.35	+40.22	+34.41
Electronic equip.	−4.59	−5.52	−2.70	−5.44
Chemicals	−5.64	−4.04	−8.58	−5.12
Textiles	+3.29	+18.83	−13.38	+12.79
Machinery	+7.43	+9.47	+4.52	+8.28
Electrical equip.	+12.85	+21.30	+12.09	+15.34
Pharmaceuticals	−15.86	−21.54	−11.20	−16.99
Rubber & plastics	+2.08	+2.33	+0.71	+4.23
Other transport eq.	−11.54	−2.82	−12.92	−11.18

Source: Author's calculations using the MIRAGE model. Sectors correspond to the GTAP 11 classification aggregated for this study. S5 (Lib. Day): Ferrous metals +12.74, Non-ferrous metals +6.52, Motor vehicles −1.43, Electronic equip. +14.41, Chemicals −2.08, Textiles +52.26, Machinery +11.74, Electrical equip. +20.07, Pharmaceuticals −23.17, Rubber & plastics +3.36, Other transport eq. +5.71.

5.6 Terms of trade effects

Table 12 reports the simulated terms-of-trade effects (percentage deviation from baseline in 2040) across all four scenarios. The terms of trade measure the ratio of export prices to import prices: a positive value indicates that a country's exports become relatively more expensive, improving its purchasing power on world markets. For the United States, terms-of-trade gains range from +1.8% under the Section 232 scenario to +3.5% under the November 2025 scenario, reflecting tariff-induced reductions in import volumes that push up the relative price of U.S. exports. These gains come at the expense of trading partners, particularly Mexico (−0.7% to −3.2%), Canada (ranging from −0.0% to +0.3% under S1–S3, declining to −0.4% under S4 as overcapacity surcharges shift competitive pressure), and Japan (−0.2% to −0.6%).

The S4 (Section 301 overcapacity) scenario produces a distinctive pattern: non-targeted economies experience varying terms-of-trade effects. India turns slightly positive (+0.07%) as redirected U.S. demand marginally improves its export prices, while Canada deteriorates (−0.36%) and EFTA remains near zero (−0.06%), reflecting the complex second-order price effects of trade diversion in a general equilibrium setting.

Table 12: Terms of trade effects by region (% deviation from baseline, 2040)

	S3 **Section 232**	**S1** **Feb. 2026**	**S2** **Nov. 2025**	**S4** **Section 301**
USA	+1.84	+2.56	+3.51	+3.08
Canada	−0.01	+0.27	−0.01	−0.36
Mexico	−0.81	−0.72	−3.17	−0.91
China	−0.13	−0.15	−0.14	−0.28
Japan	−0.21	−0.30	−0.38	−0.63
South Korea	−0.46	−0.55	−0.58	−0.81
India	−0.20	−0.27	−0.61	+0.07
Brazil	−0.23	−0.10	+0.08	−0.48
Germany	−0.15	−0.21	−0.16	−0.34
France	−0.03	−0.13	−0.42	−0.18
Italy	−0.12	−0.25	−0.14	−0.42
Spain	−0.05	−0.16	−0.10	−0.23
Rest of EU27	−0.06	−0.14	−0.16	−0.18
UK	+0.02	+0.00	+0.05	+0.05
EFTA	−0.07	−0.14	−0.30	−0.06
ASEAN	−0.11	−0.24	−0.31	−0.34
Australia & NZ	−0.18	−0.22	−0.37	−0.20
CIS	−0.05	+0.03	−0.01	+0.06
MENA	−0.06	−0.01	−0.14	+0.07
Sub-Saharan Africa	−0.07	−0.03	−0.04	−0.01
Rest of Lat. America	−0.15	−0.27	−0.12	−0.32
RoW	+0.10	+0.09	+0.09	+0.13

Source: MIRAGE simulations, percentage deviation from baseline in 2040.

6 Conclusion

In this paper, I have analyzed the trade policy architecture of the second Trump administration through an institutional lens and a quantitative general equilibrium framework. The chronological arc from IEEPA imposition in early 2025, through its judicial invalidation in February 2026, to the pivot to Section 122 and the launch of Section 301 investigations in March 2026, reveals a policy regime in continuous legal adaptation, shaped as much by institutional constraints and judicial pushback as by strategic design. By embedding these instruments in the MIRAGE model, the paper provides a coherent quantitative assessment that distinguishes the protectionist costs of unilateral tariff escalation from the partial mitigation achieved through bilateral deals.

The five simulated scenarios confirm that U.S. tariff escalation generates welfare and

GDP losses for the United States and most of its trading partners across all configurations. The IEEPA architecture (Scenario 2) and its peak Liberation Day configuration (Scenario 5) represent the most costly realized regimes, with the latter producing the largest GDP contractions in absolute terms. Under Section 232 alone (Scenario 3), losses are more moderate but remain non-negligible. The design of the tariff instrument - its coverage breadth, partner targeting, and interaction with existing preferential arrangements - matters as much as the average tariff level. The targeted Section 301 scenario (Scenario 4) generates trade diversion toward non-targeted economies, where India and the rest of Latin America record modest GDP gains, in contrast to the near-universal losses produced by broad-based instruments. These asymmetries depend sensitively on the exact configuration of exemptions and on the relative export exposure of each partner.

Several broader policy implications follow. Even if, retaliatory responses from Canada and China are incorporated in the simulations, the framework abstracts from endogenous escalation dynamics and from longer-term effects on global value chains in sectors such as semiconductors and automotive. The potential transition from Section 122 to Section 301 before mid-2026 would shift the tariff regime toward greater legal durability and an asymmetric distributional profile, with substantial consequences for targeted versus non-targeted economies. If major partners conclude framework agreements reducing tariff burdens further, the trade diversion dynamics documented here would be substantially modified.

The most distinctive feature of the current episode is the role played by legal institutions in shaping economic outcomes. The Supreme Court's February 2026 ruling did not merely invalidate one statutory instrument; it forced a rapid architectural reorganization of the entire tariff regime, with immediate consequences for the level, composition, and expected durability of U.S. protection. Modeling legal durability and institutional constraints alongside the standard economic mechanisms of tariff incidence represents a frontier for future quantitative assessments of U.S. trade policy.

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Appendices

A IEEPA reciprocal tariffs

Table 13 lists the 65 countries whose IEEPA reciprocal tariff rates remained above the +10 percentage point floor following the expiration of the 90-day pause on July 31, 2025. The rates shown are additional tariffs (in percentage points) that stack with any applicable Section 232, Section 301, and MFN tariffs. China is not included in the reciprocal tariff list (Annex 1 of the April 2, 2025 executive order) and is subject to a separate regime combining IEEPA fentanyl duties, a residual reciprocal component, and legacy Section 301 tariffs. Japan and South Korea are marked with an asterisk to indicate that their IEEPA rates were superseded by framework deals during this period.

Table 13: Countries with IEEPA Reciprocal Tariff Rates Above +10 pp (End of July 2025)

Country	Rate (pp)	Country	Rate (pp)	Country	Rate (pp)
Syria	+41	Malaysia	+19	Iceland	+15
Myanmar (Burma)	+40	Nicaragua	+18	Israel	+15
Laos	+40	Afghanistan	+15	Jordan	+15
Switzerland	+39	Angola	+15	Lesotho	+15
Serbia	+35	Bolivia	+15	Liechtenstein	+15
Iraq	+35	Botswana	+15	Madagascar	+15
South Africa	+30	Cameroon	+15	Malawi	+15
Algeria	+30	Chad	+15	Mauritius	+15
Libya	+30	Côte d'Ivoire	+15	Mozambique	+15
Bosnia & Herz.	+30	Costa Rica	+15	Namibia	+15
India	+25	DR Congo	+15	Nauru	+15
Tunisia	+25	Ecuador	+15	New Zealand	+15
Kazakhstan	+25	Equatorial Guinea	+15	Nigeria	+15
Moldova	+25	Fiji	+15	North Macedonia	+15
Brunei	+25	Ghana	+15	Norway	+15
Sri Lanka	+20	Guyana	+15	Papua New Guinea	+15
Vietnam	+20	Trinidad & Tobago	+15	Turkey	+15
Taiwan	+20	Uganda	+15	Vanuatu	+15
Bangladesh	+20	Venezuela	+15	Zambia	+15
Philippines	+19	Zimbabwe	+15	Japan*	+15
Pakistan	+19			South Korea*	+15
Indonesia	+19				
Cambodia	+19	*At +10 pp floor:* Brazil, Falkland Islands, United Kingdom			
Thailand	+19	*Excluded (separate regime):* China			

Source: Author's compilation from executive orders and Federal Register notices. Rates are additional IEEPA reciprocal tariffs in percentage points, applicable after the expiration of the 90-day pause (July 31, 2025). *Framework deals superseded these rates for Japan and South Korea. EU member states covered by a framework deal. China subject to a separate regime (see text).

Table 14: Liberation Day reciprocal tariff rates (additional pp above MFN, April 2, 2025)

Partner	Rate (pp)	Partner	Rate (pp)	Partner	Rate (pp)
China	+34	EU (all members)	+20	Japan	+24
Vietnam	+46	India	+26	South Korea	+25
Taiwan	+32	Thailand	+36	Indonesia	+32
Switzerland	+31	Malaysia	+24	Cambodia	+49
South Africa	+30	Bangladesh	+37	Sri Lanka	+44

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Partner	Rate (pp)	Partner	Rate (pp)	Partner	Rate (pp)
Pakistan	+29	Laos	+48	Myanmar	+44
Philippines	+17	Israel	+17	Brazil	+10
Nicaragua	+18	Algeria	+30	Iraq	+39
Libya	+31	Serbia	+37	Syria	+41
Tunisia	+28	Kazakhstan	+27	Moldova	+31
Brunei	+24	UK	+10	Norway	+15
New Zealand	+20	Fiji	+32	Madagascar	+47
Bosnia & Herz.	+35	All others		+10	

Source: Executive Order of April 2, 2025, "Regulating Imports with a Reciprocal Tariff," 90 *Fed. Reg.* 15,041. Rates are additional percentage points above the applied tariff. China's rate is on top of pre-existing Section 301 and IEEPA fentanyl tariffs. EU rate applies to all 27 member states. Partners not listed individually face the universal +10 pp floor.

B Liberation Day scenario results (Scenario 5)

This appendix reports the full simulation results for Scenario 5 (Liberation Day), which captures the tariff regime at its most restrictive, corresponding to the aftermath of the April 2, 2025 IEEPA executive order before any framework deals or pausing of reciprocal tariffs. The trade-weighted average tariff reaches 26.4%, the highest across all five scenarios. These tables complement the main results tables in Section 5, which report Scenarios 1–4.

Table 15: Global macroeconomic effects for Liberation Day (Scenario 5, % deviation from baseline, 2040)

	Scenario 5 (Lib. Day)	Memo: Range S1–S4
World GDP (vol)	−0.62	[−0.26; −0.54]
World Welfare	−0.58	[−0.23; −0.49]
World Imports (vol)	−3.37	[−2.05; −3.52]
World Exports (vol)	−3.34	[−2.06; −3.51]
World Goods Imports (vol)	−3.97	[−2.46; −4.19]
World Goods Exports (vol)	−3.95	[−2.48; −4.21]

Source: Author's calculations using the MIRAGE model.

Table 16: Effects on the United States for Liberation Day (Scenario 5, % deviation from baseline, 2040)

	Scenario 5 (Lib. Day)	Memo: Range S1–S4
GDP (vol)	−1.28	[−0.37; −0.87]
Welfare	−1.10	[−0.18; −0.66]
Imports (vol)	−15.82	[−8.14; −16.33]
Exports (vol)	−21.21	[−12.00; −22.67]

Source: Author's calculations using the MIRAGE model. Imports and exports in volume, excluding intra-regional trade.

Table 17: GDP effects by country/region in Liberation Day (Scenario 5, % deviation from baseline, 2040)

Country/Region	Scenario 5 (Lib. Day)	Memo: Range S1–S4
USA	−1.28	[−0.37; −0.87]
Canada	−0.69	[−2.59; −0.85]
Mexico	−0.54	[−6.55; −3.68]
China	−0.71	[−0.11; −0.36]
Germany	−0.80	[−0.30; −0.90]
Rest of EU27	−0.62	[−0.23; −0.74]
France	−0.30	[−0.19; +0.13]
Italy	−0.37	[−0.09; −0.67]
Spain	−0.21	[−0.07; −0.26]
UK	−0.12	[−0.11; +0.11]
EFTA	−0.81	[−0.06; +0.08]
Japan	−0.51	[−0.15; −0.34]
South Korea	−0.17	[−0.17; −1.08]
India	−0.54	[+0.02; +0.27]
ASEAN	−0.36	[−0.21; −0.38]
Brazil	+0.11	[−0.02; +0.09]
Australia & New Zealand	−0.12	[−0.12; −0.02]
CIS	−0.08	[−0.11; −0.07]
Rest of Latin America	+0.21	[−0.07; +0.35]
Middle East & North Africa	+0.01	[−0.19; −0.10]
Sub-Saharan Africa	−0.23	[−0.07; −0.00]
Rest of World	−0.41	[−0.56; −0.21]

Source: Author's calculations using the MIRAGE model.

Table 18: Welfare Effects by Country/Region — Liberation Day (Scenario 5, % deviation from baseline, 2040)

Country/Region	Scenario 5 (Lib. Day)	Memo: Range S1–S4
USA	−1.10	[−0.18; −0.66]
Canada	−0.93	[−2.63; −0.95]
Mexico	−0.46	[−6.10; −4.44]
China	−0.53	[−0.10; −0.28]
Germany	−0.77	[−0.29; −0.89]
Japan	−0.61	[−0.15; −0.41]
South Korea	−0.73	[−0.37; −0.96]
India	−0.45	[−0.76; +0.17]
ASEAN	−0.92	[−0.23; −0.72]
Brazil	+0.07	[−0.16; −0.00]

Source: Author's calculations using the MIRAGE model.

C Geographical and sectoral aggregation

Tables 19 and 20 detail the geographical and sectoral aggregation used in this paper. The GTAP 11 database (160 countries, 65 sectors) is aggregated into 22 regions and 35 sectors, selected to identify the major targets of U.S. trade measures and their principal trading partners, and to capture the most affected industries.

Table 19: Geographical Aggregation (22 Regions)

Model Region	Countries/Territories Included
USA	United States
Canada	Canada
Mexico	Mexico
France	France
Germany	Germany
Italy	Italy
Spain	Spain
Rest of EU27	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Rep., Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden
UK	United Kingdom
EFTA	Switzerland, Norway, Rest of EFTA
China	China
Japan	Japan
South Korea	Republic of Korea
India	India
ASEAN	Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam
Brazil	Brazil
Australia & NZ	Australia, New Zealand
CIS	Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Ukraine, Uzbekistan, Rest of Former Soviet Union
Rest of Latin Am.	Argentina, Bolivia, Chile, Colombia, Costa Rica, Dominican Rep., Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad & Tobago, Uruguay, Venezuela, Rest of South America, Rest of Caribbean, Rest of Central America
Middle East & NA	Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Palestinian Terr., Qatar, Saudi Arabia, Syria, Tunisia, Turkey, UAE, Rest of North Africa, Rest of Western Asia
Sub-Saharan Africa	Benin, Botswana, Burkina Faso, Cameroon, CAR, Chad, Comoros, Congo, DRC, Côte d'Ivoire, Equatorial Guinea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe, South Central Africa, Rest of Eastern Africa, Rest of SACU, Rest of Western Africa
Rest of World	Afghanistan, Bangladesh, Georgia, Haiti, Hong Kong, Iran, Israel, Mongolia, Nepal, Pakistan, Serbia, Sri Lanka, Taiwan, Rest of East Asia, Rest of Europe, Rest of Eastern Europe, Rest of North America, Rest of Oceania, Rest of South Asia, Rest of Southeast Asia, Rest of the World

Source: Author's aggregation from GTAP power database (version 11).

Table 20: Sectoral Aggregation (35 Sectors)

Model Sector	Category	GTAP Sectors Included
Oil	Energy	Oil
Gas		Gas, Gas manufacture
Coal		Coal
Refined oil		Petroleum and coal products
TND		Power transmission and distribution
Power		Electricity (nuclear, coal, gas, wind, hydro, oil, solar base/peak)
ElBase		Nuclear, coal, hydro, other base load electricity
ElPeak		Gas, hydro, oil peak load electricity
ElInt		Wind base load, solar peak load electricity
Cereals	Agriculture	Paddy rice, wheat, cereal grains nec
Other crops		Vegetables/fruit/nuts, sugar cane/beet, plant-based fibers, crops nec
Oil seeds		Oil seeds
Animal agri.		Cattle/sheep/goats/horses, animal products nec, raw milk, wool
Forestry/fish		Forestry, fishing
Minerals		Other extraction, mineral products nec
Meat	Manufacturing	Bovine meat, meat products nec
Other food		Vegetable oils, processed rice, sugar, food products nec
Dairy		Dairy products
Bev./tobacco		Beverages and tobacco
Textiles		Textiles, wearing apparel, leather products
Wood/paper		Wood products, paper products/publishing
Chemicals		Chemical products
Pharmaceuticals		Basic pharmaceutical products
Rubber/plastics		Rubber and plastic products
Ferrous metals		Ferrous metals
Non-ferrous metals		Non-ferrous metals, metal products
Electronics		Computer, electronic, and optical products
Electrical equip.		Electrical equipment
Machinery		Machinery and equipment nec
Motor vehicles		Motor vehicles and parts
Other transp. eq.		Transport equipment nec
Other manuf.		Manufactures nec
Services	Services	Water, construction, trade, accommodation, recreation, public admin., education, health, dwellings
Transport		Transport nec, water transport, air transport, warehousing
Business serv.		Communication, financial services, insurance, real estate, business services nec

Source: Author's aggregation from GTAP power database (version 11).

D Tariff evolution by partner

Figures 4 to 7 display the evolution of the U.S. average applied tariff rate on imports from selected trading partners (China, Japan, South Korea, and Brazil), constructed using a step-function (escalier) representation: the tariff level stays constant between policy changes, and jumps vertically at each change date. Each event label now shows the policy name and the tariff level (%) reached at that event date; a dashed reference line indicates the baseline tariff level at January 2025. Charts for France and India will be added once the corresponding SAS data are generated. The all-partners aggregate chart is presented in Figure 2 in the main text.

China stands out with by far the highest applied tariff rate, peaking at 136.5% in the weeks following Liberation Day (April 2025), before declining to 36.1% by February 2026 as framework deals moderated the IEEPA reciprocal surcharges. Japan and South Korea show more moderate profiles—peaking at 21.7% and 18.7% respectively—consistent with the framework deals concluded with both partners in mid-2025 that partially offset IEEPA escalation.

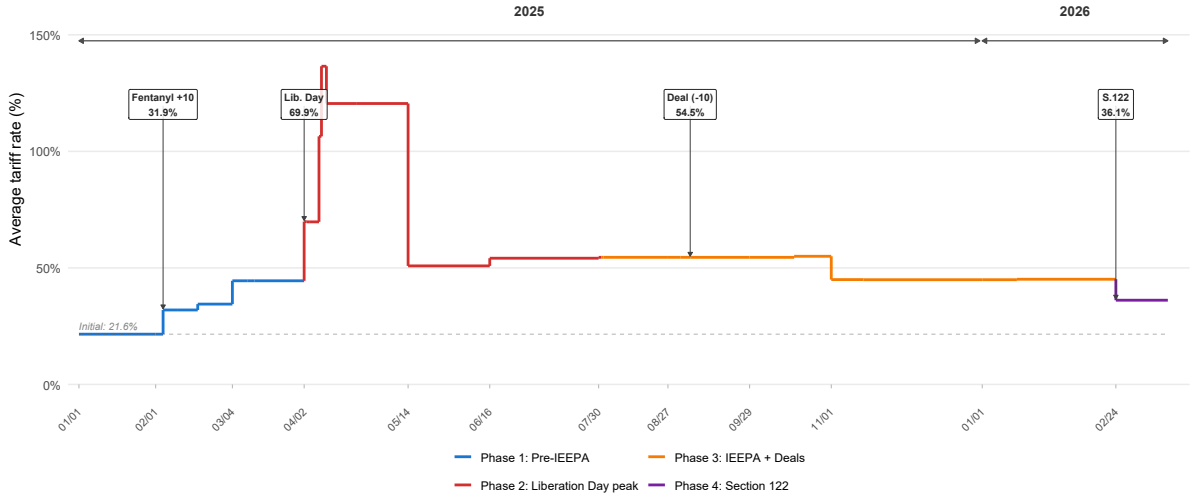

Figure 4: U.S. average applied tariff rate on imports from China (%), January 2025 – March 2026 (step-function, reference group-weighted). Event labels show the policy name and tariff level at the event date. Dashed line indicates the initial tariff level. Source: author's calculations.

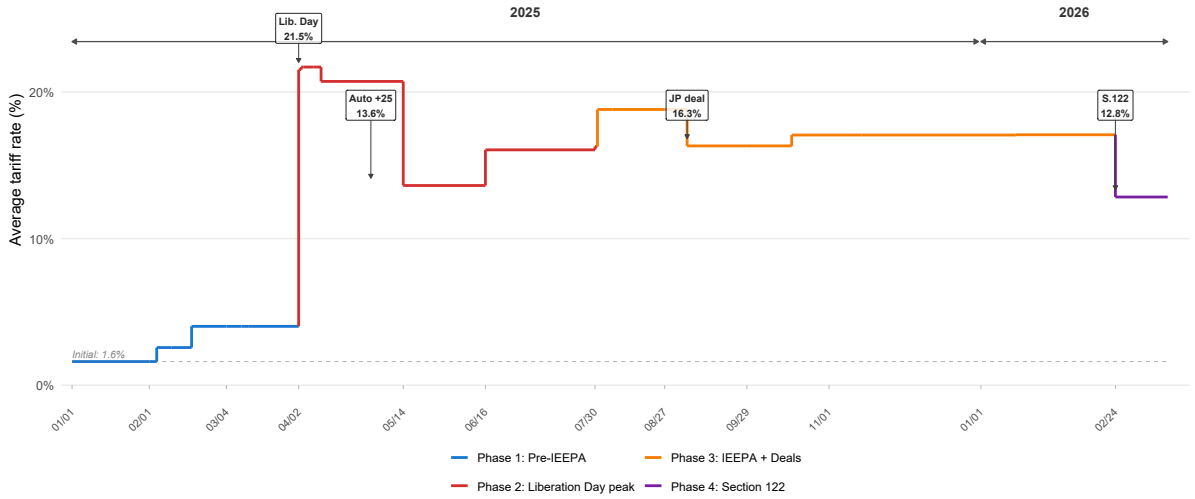

Figure 5: U.S. average applied tariff rate on imports from Japan (%), January 2025 – March 2026 (step-function, reference group-weighted). Event labels show the policy name and tariff level at the event date. Dashed line indicates the initial tariff level. Source: author's calculations.

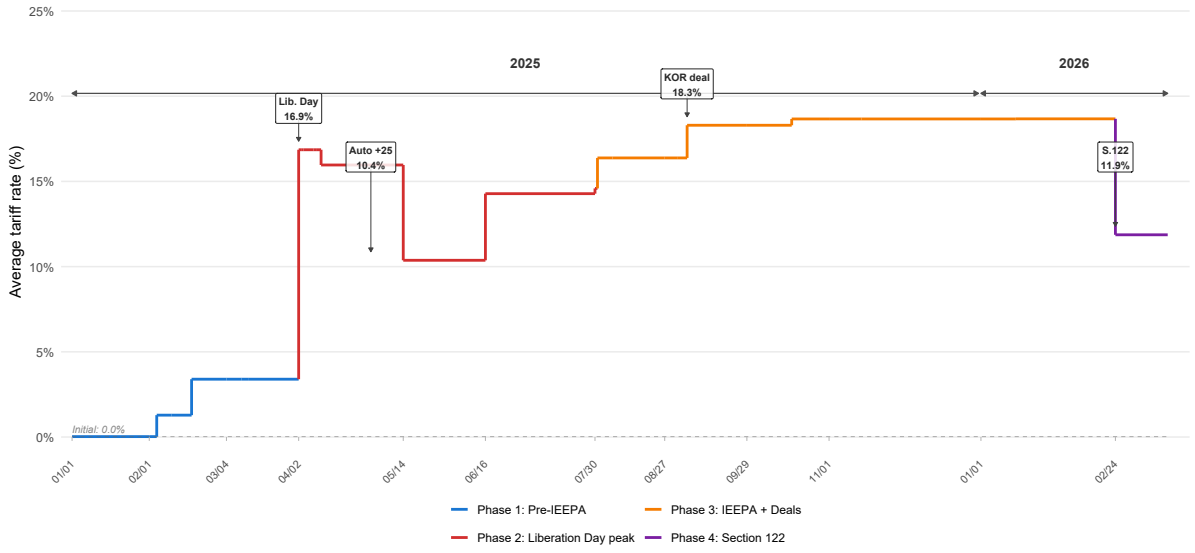

Figure 6: U.S. average applied tariff rate on imports from South Korea (%), January 2025 – March 2026 (step-function, reference group-weighted). Event labels show the policy name and tariff level at the event date. Dashed line indicates the initial tariff level. Source: author's calculations.

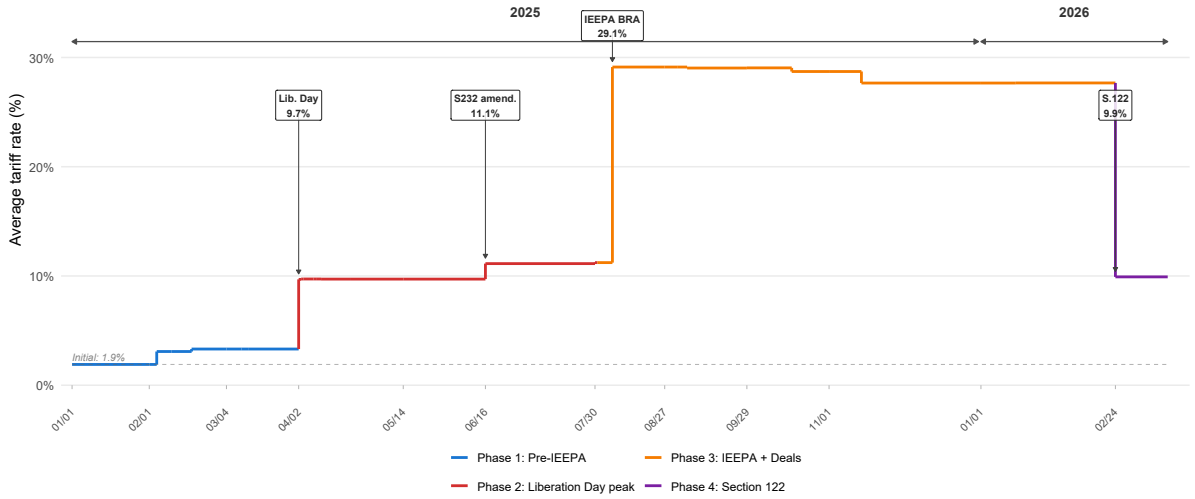

Figure 7: U.S. average applied tariff rate on imports from Brazil (%), January 2025 – March 2026 (step-function, reference group-weighted). Event labels show the policy name and tariff level at the event date. Dashed line indicates the initial tariff level. Source: author's calculations.

E List of executive orders and proclamations by instrument

Table 21 provides a comprehensive list of the executive orders, presidential proclamations, and Federal Register notices that define the tariff architecture analyzed in this paper, organized by statutory instrument. Each entry includes the signature date, the implementation (entry-into-force) date, a brief title, and the Federal Register citation with a web link where available.

Table 21: Executive orders and proclamations by statutory instrument (January 2025 – March 2026)

Signed	In force	Title/Description	Citation / Link
Section 232 (National Security)			
2025-01-20	–	America First Trade Policy (directing S232 reviews)	Memo. of Jan. 20, 2025; 90 FR 8,471. https://www.federalregister.gov/d/2025-02032
2025-02-04	2025-03-12	Steel tariffs reinstated at 25%	Proclamation; 90 FR 11,425. https://www.federalregister.gov/d/2025-02574
2025-02-18	2025-03-12	Aluminum derivatives & extended coverage	Proclamation; 90 FR 12,201. https://www.federalregister.gov/d/2025-03141

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Signed	In force	Title/Description	Citation / Link
2025-03-26	2025-04-03	S232 tariffs on Automobiles & auto parts (25%)	Proclamation; 90 FR 14,891. https://www.federalregister.gov/d/2025-05865
2025-06-03	2025-06-04	Steel & aluminum tariffs raised to 50% (Proc. 10947)	Proc. 10947; 90 FR 24,199. https://www.federalregister.gov/d/2025-10524
2025-07-30	2025-08-01	S232 tariffs on Copper (50%)	Proc. 10962; 90 FR –. https://www.presidency.ucsb.edu/documents/proclamation-10962-adjusting-imports-copper-into-the-united-states
2025-09-29	2025-10-14	S232 tariffs on Timber & Lumber: softwood lumber 10%, upholstered furniture & kitchen cabinets 25% (Proc. 10976)	Proc. 10976; 90 FR 48,127. https://www.federalregister.gov/d/2025-19482
2025-10-17	2025-11-01	S232 tariffs on medium- & heavy-duty trucks & parts (25%), buses (10%) (Proc. 10984)	Proc. 10984; 90 FR 48,451. https://www.federalregister.gov/d/2025-19639
2026-01-14	2026-01-15	S232 tariffs on advanced semiconductors (25%; Proc. 11002)	Proc. 11002; 91 FR 2,443. https://www.federalregister.gov/d/2026-01052
IEEPA (International Emergency Economic Powers Act)			
2025-02-01	2025-02-04	Fentanyl: +10 pp on China	EO 14,195; 90 FR 9,121. https://www.federalregister.gov/d/2025-02064
2025-02-01	2025-02-04	Northern border: +25 pp on Canada	EO 14,193; 90 FR 9,113. https://www.federalregister.gov/d/2025-02062
2025-02-01	2025-02-04	Southern border: +25 pp on Mexico	EO 14,194; 90 FR 9,113. https://www.federalregister.gov/d/2025-02063
2025-03-03	2025-03-04	Fentanyl: China raised to +20 pp	EO 14,228; 90 FR 11,463. https://www.federalregister.gov/d/2025-03551
2025-04-02	2025-04-05	Liberation Day: reciprocal tariffs on all partners	EO 14,257; 90 FR 15,041. https://www.federalregister.gov/d/2025-06063
2025-04-09	2025-04-10	90-day pause: +10 pp floor maintained	EO 14,266; 90 FR 15,625. https://www.federalregister.gov/d/2025-06462

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Signed	In force	Title/Description	Citation / Link
2025-07-31	2025-08-07	Higher IEEPA rates reinstated for non-cooperators (EO 14,326)	EO 14,326; 90 FR –. https://www.federalregister.gov/d/2025-15010
2025-11-14	2025-11-13	Final IEEPA version: revised country rates & exemptions	EO 14,360; 90 FR –
2026-02-20	2026-02-24	Termination of all IEEPA tariff orders ("Ending Certain Tariff Actions")	EO; 91 FR 9,437. https://www.federalregister.gov/documents/2026/02/25/2026-03832/ending-certain-tariff-actions
Section 122 (Emergency Balance-of-Payments)			
2026-02-20	2026-02-24	Global +10 pp tariff under Section 122	Proclamation; 91 FR 13,901. https://www.federalregister.gov/d/2026-03202
Section 301 (Unfair Trade Practices)			
2026-03-11	–	S301 investigation: 16 economies, overcapacity	USTR Notice; 91 FR – (Doc. 2026-05214, publ. Mar. 17, 2026). https://www.federalregister.gov/d/2026-05214
2026-03-12	–	S301 investigation: 60 economies, forced labor	USTR Notice; 91 FR – (Doc. 2026-05151, publ. Mar. 17, 2026). https://www.federalregister.gov/d/2026-05151
Framework Deals			
2025-06-16	–	US-UK framework deal	https://www.whitehouse.gov/briefings-statements/us-uk-trade-deal-2025/
2025-09-05	–	US-EU framework deal	https://www.whitehouse.gov/briefings-statements/us-eu-trade-deal-2025/
2025-09-05	–	US-Japan framework deal	https://www.whitehouse.gov/briefings-statements/us-japan-trade-deal-2025/
2025-09-05	–	US-South Korea framework deal	https://www.whitehouse.gov/briefings-statements/us-korea-trade-deal-2025/